MARINE REVIEW

VOL. XVIII. Published every Thursday at 418-19 Perry-Payne Bldg. CLEVELAND, O., DECEMBER 29, 1898. Entered at Cleveland Postoffice as second class matter. No. 25.

TWO MORE NEW FREIGHTERS—THE LAKE SHIP YARDS.

Two more contracts for steel freight steamers have been closed with lake ship builders within the past few days. The Cleveland Ship Building Co. is to build at Lorain a steel steamer of Welland canal dimensions for W. A. Hawgood and others of Cleveland, and the Union Dry Dock Co. of Buffalo, Edward Gaskin, manager, has about completed arrangements with manager G. L. Douglas of the Western Transit Co. (lake line of the New York Central railway system) for a package freight steamer that will be practically a duplicate of the Troy, the largest package freighter on the lakes, which was built for the same company only a short time ago by the Detroit Dry Dock company. All the builders are still figuring on new work, and contracts for two or three more vessels would be closed at once, but for the inability of the shipyards to meet requirements as to delivery. It is understood that the Cleveland Ship Building Co. has agreed to deliver the Hawgood boat about May 15, notwithstanding the rush of work now on at the Lorain yard with two freight steamers of the largest type under construction. This vessel will carry about 3,000 gross tons. She will be 252 feet over all, 238 feet keel, 42 feet beam and 26½ feet depth—practically a duplicate of the steamer Huron, built recently by the same company for R. R. Rhodes and others of Cleveland. She will have no main deck and no package freight arrangements, but will be built with a view to supplying these later if desired. Engines will be of triple expansion type, with cylinders of 18½, 31½ and 51 inches diameter and a comon stroke of 36 inches. Two Scotch boilers of 12 feet diameter and 11 feet length will be built to withstand 170 pounds presure. It is not known as yet whether the new steamer to be built at Buffalo will differ materially from the Troy, or whether she is to be in all respects a duplicate of that fine package freighter. The Union Dry Dock Co. has for some time past been making extensive improvements in its ship yard, including an overhead crane system, new shops, more tools, etc., and is fully prepared for the construction of ships of the largest type now in service on the lakes.

One of the largest complete friction dipper dredges in the world is now under construction at the yard of Hingston & Wood at Buffalo. The builders state that when completed this dredge will exceed in power any dredge ever built, and will be 35 per cent. larger than any previously constructed in the United States. The dredge is 136 feet long, 42 feet 6 inches beam and 13 feet 6 inches depth. The height from keel to top will be 32 feet. Ohio oak and Douglas fir from Oregon are being used exclusively in the construction. Steel instead of timber trusses are used for strengthening. The main trusses are 119 feet in length, 25 feet high and 26 feet broad, and in addition there are two steel trusses, one on either side, 119 feet long and 13 feet deep. The machinery, which weighs 400 tons, was built by the Bucyrus Steam Shovel & Dredge Co. of South Milwaukee, Wis. The equipment consists of two double high pressure engines, 18 by 24, and two swing engines, 12 by 16, used for swinging the dipper. The backing engines for the purpose of pulling the boom into position are 10 by 16 inches. The main shaft is 13 inches in diameter, and the main gears are of steel and 12 feet in diameter, with 12-inch face and 4½ inches pitch. The intermediate shaft, which extends entirely across the boat, is 8 inches in diameter and operates the speed hoist. The spuds themselves are 4 feet square forward and 2 feet square aft. The A frame forward is 53 feet in height and the crane is 53 feet long. The hoisting cable is of the best flexible steel, 2¾ inches in diameter, and runs over sheaves 8 feet in diameter. The dipper has a capacity of 8¼ cubic yards. The largest dippers previously built were used on two dredges at the World's Fair and were of a capacity of 7 cubic yards each. The dredge is strengthened by having the decks, sides and bottom, stayed together with sixty-eight wrought iron knees, weighing 360 pounds each. The boom weighs 35 tons. Farrar & Trefts of Buffalo will fit the dredge with return flue marine boilers, 8½ by 12 feet in size, and capable of a working pressure of 150 pounds. Coal bunkers with a capacity of 150 tons are ranged on the sides of the lower deck. Suitable quarters are provided for a crew of nineteen men. A complete electric light plant will be installed and the dredge will be provided with a carpenter and blacksmith shop. The capacity of the dredge must, according to the stipulations of the contract, be such that it can raise one full load from water 25 feet deep every 45 seconds, or in other words will have a capacity of 15,000 tons per ten hours.

ANOTHER CONTRACT FOR HARLAN & HOLLINGSWORTH.

The Harlan & Hollingsworth Co., Wilmington, Del., whose recently enlarged ship yard is already crowded with work, has just been successful in securing another handsome contract. This latest order is from Messrs. Miller, Bull & Knowlton of Hanover Square building, Pearl street, New York City, owners of the first American "tramp" steamer, the Winifred, and is for a duplicate of the steamer Ponce, for which a contract was let to the Harlan & Hollingsworth Co. some time ago, and which is now under way. The new vessel, to be named the San Juan, will be a single-screw, steel, spar deck steamer, 335 feet in length, 42 feet beam and 36½ feet depth of hold. She will be built as a freight carrier, but will have accommodations for about fifty passengers. She will be of 3,000 tons gross, with 170,000 cubic feet measurement, and with a speed of 13 knots. The vessel will have six watertight compartments and will be built on strictly modern lines. Steam will be furnished from two Scotch boilers at a working pressure of 180 pounds.

It is reported that the Mallory line, New York, is considering the matter of having a new steamer built next year to replace the State of Texas, which was sold to the Merchants' & Miners' Trans. Co. of Baltimore.

PROMISING OUTLOOK FOR SHIPS.

At no time in the history of lake shipping has the outlook for a new season of navigation been more promising than at present. This statement has special relation, of course, to the great volume of business that is in sight. The days of dollar ore, or even 75-cent ore, on season contracts are, of course, a matter of the past. The average rate on all ore moved from the head of Lake Superior during 1898 was but a trifle over 59 cents. Most contracts last spring were made at 60 cents, and there was not much season ore to be had for vessels other than those of the ore companies, even at that figure. The big ships can carry ore at a profit on that basis, but it would certainly seem now that if they are held out for a better figure during the coming season they will get it. Nothing has been done as yet by the ore companies, and they will take no action regarding sales or lake freights until meetings of the Bessemer association are held during the early part of the coming month, but prices will certainly be higher and the business of the new year will be closed up much earlier than usual. Producers of non-Bessemer ores have failed completely in their efforts to form an association, and are already selling small lots of their product for the coming year, but this is not the principal interest, and these sales are not of a kind that will establish freights. The fact that sales of ore of any kind are being made before the opening of the new year is, however, an indication of the promising condition of the iron industry. The strength of this industry rather increases with the close of the year. Instead of holiday dullness, it is evident that the height of the movement in iron and steel has not yet been reached. In all branches of the industry manufacturers are sold up for several months in 1899.

SHAMROCK OF STEEL CONSTRUCTION.

No little surprise has been occassioned by the cable dispatches of the past week stating that Sir Thomas Lipton has decided to build the Shamrock, challenger for the America's cup, of steel rather than wood. Since 1887 the composite type has been used almost universally in yacht construction abroad. The only foreign steel yachts which ever raced for the America's cup were the Galatea and the Thistle. When Watson and the other British designers gave up steel and other metal, the Herreshoffs took it up, and of the big yachts which they built in 1893 the Navahoe and Colonia were of steel and the Vigilant of Tobin bronze. The Pilgrim and Jubilee, whose construction followed soon after, were also of steel.

The latest cable reports also assert that the new Lipton boat will be built at the Thornycroft's Chiswick yard on the Thames instead of at Harland & Wolff's at Belfast, as originally announced. The material selected is said to be nickel steel of Krupp make.

NEW GUNBOAT FOR THE LAKES.

A general description of the gunboat which is to replace the U. S. S. Michigan on the great lakes and for which provision was made in the last naval appropriation bill, has been given out by Rear Admiral R. G. Skerrett (retired). The new vessel, which will be known as gunboat No. 16, will be a practical duplicate of the Marietta, which was illustrated and described at length in a recent number of the Review. This vessel will, of course, be constructed at one of the ship yards on the great lakes. She will be 174 feet on the load water line, 34 feet beam, 12 feet mean draught, 1,000 tons displacement, 14 knots speed, 1,200 horse power and 200 tons coal bunker capacity. The vessel will have twin screws, driven by two sets of triple expansion engines, making 200 revolutions per minute. Steam will be supplied by water tube boilers at a pressure of 200 pounds. The armament will consist of six 4-inch rapid-fire rifles, four 6-pounders, two 1-pounders and one Colt.

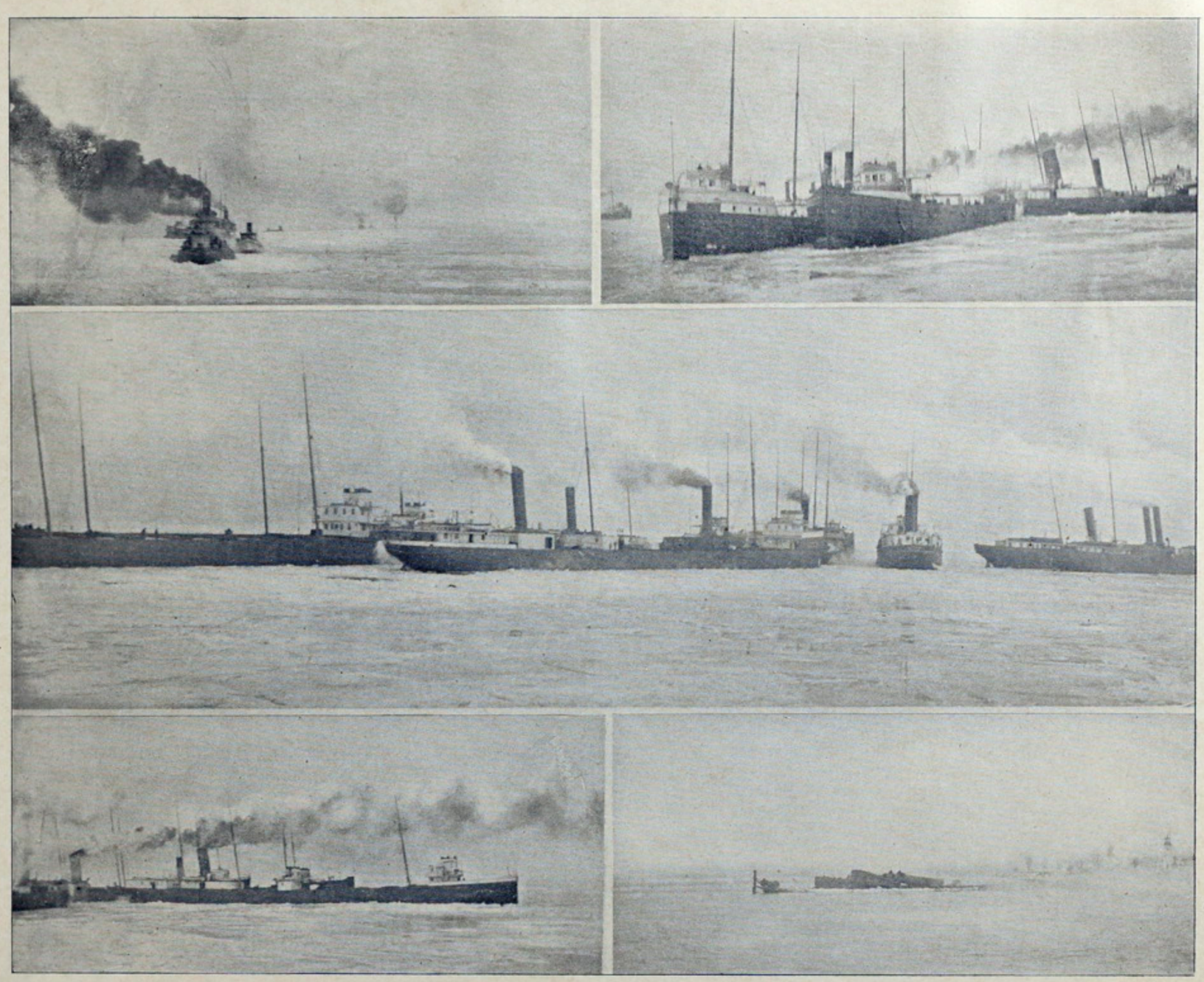
Maj. Clinton B. Sears, United States engineer at Duluth, Minn., recently opened bids for revetment work at the Portage lake ship canals, Mich. The lowest bid was $58,715.10, submitted by Fitzgerald & Norris, Duluth, Minn. Other bids were: Edward Gillen, Racine, Wis., $88,580.80; Powell & Mitchell, Marquette, Mich., $65,190; Frank Campbell, Duluth, Minn., $68,785; John M. Borgman, Kewaunee, Wis., $76,842.10; Frederick Davis, Duluth, Minn., $65,783.31; Frank P. Tims, West Duluth, Minn., $60,350.

Monday, Jan. 16 is the date fixed for the annual meeting of the National Marine Engineers Beneficial Association at Willard's Hotel, Washington, D. C. There are several important matters to come before the national body this year, and a large attendance from subordinate associations is expected. The American Association of Masters and Pilots of Steam Vessels and United States board of supervising inspectors of steam vessels will be in session in Washington during the same week.

Some one with a fondness for statistics has figured out an estimate according to which losses on Atlantic steamers since 1840 aggregate more than $42,000,000, while the value of the lost cargoes is set down at $20,000,000, not over two thirds of which was covered by insurance.

American manufacturers of ship building tools may find a market for their products with the newly organized Selby Ship Building & Engineering Co., Ltd., which is establishing yards at Selby, England. The new company will be capable of building any type of vessel up to 1,200 tons.

The Drake & Stratton Co. of Pittsburg, has secured a contract from the United States Government for the construction of a great dock at Havana, Cub., and has already dispatched 500 laborers and two ship loads of machinery.



PHOTOS BY ALVORD & CO., DETROIT.

VIEWS OF THE ICE JAM DURING CLOSING DAYS OF NAVIGATION ON LAKE ERIE, SEASON OF 1898.

Some 100 vessels were either caught fast in great fields of ice below the Detroit river, Lake Erie, or prevented from passing up or down for ten days in the early part of December. They were released by car ferries and tugs at an expense aggregating $15,000 to $18,000. Among vessels included in the above views are the steamers I. W. Nicholas, Neshoto, Olympia, Globe and Senator, as well as whalebacks, the tug Mason and one of the car ferries. In the lower right hand corner is the wreck of the steamer Aurora, sunk and burned near Bois Blanc Island, Detroit river.

MORE THAN 21,000,000 TONS

COMMERCE OF CANALS AT SAULT STE. MARIE DURING THE PAST SEASON—MORE THAN 2,000,000 TONS IN EXCESS OF ANY PREVIOUS YEAR.

As had been anticipated in monthly reports published by the Marine Review, the commerce of Lake Superior, represented by reports of the two canals at the Sault, Canadian and American, is full two and a quarter million tons in excess of any previous year. Of the total of 21,234,664 tons of freight passing to and from Lake Superior during the season, 18,184,151 tons was passed through the United States canal and 3,050,513 tons (net tons in all cases) through the Canadian canal. The principal increases over 1897 are in iron ore, soft coal and grain. In flour there is a decrease of more than a million barrels, while in iron ore the increase is a little more than a million tons. Shipments of soft coal aggregated 3,235,607 tons during the past season. In 1897 the aggregate was 2,502,-973. Heavy shipments of wheat late in the season brought the total up to 62,339,996 bushels, against 55,924,302 bushels in 1897. Of grain other than wheat the total is 26,078,384 bushels in 1898, against 24,889,688 bushels during 1897. The following tables are from official reports of the United States war department:

COMPARATIVE STATEMENT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR FOR THE SEASONS OF 1897 AND 1898--COMMERCE OF BOTH CANALS, CANADIAN AND AMERICAN.

Items.	Designation.	Seasons. 1897	Seasons. 1898	Increase, per cent.	Decrease, per cent.
Vessels (A)	Number	17,171	17,761	3	
Lockages	Number	8,571	9,533	11	
Tonnage, registered	Net tons	17,619,933	18,622,754	6	
Tonnage, freight	Net tons	18,982,755	21,234,664	12	
Passengers	Number	40,213	43,426	8	
Coal, hard	Net tons	536,199	540,843	1	
Coal, soft	Net tons	2,502,973	3,235,607	29	
Flour	Barrels	8,921,143	7,778,043	....	13
Wheat	Bushels	55,924,302	62,339,996	11	
Grain other than wheat	Bushels	24,889,688	26,078,384	5	
Manufactured and pig iron	Net tons	135,164	250,170	85	
Salt	Barrels	285,449	301,560	6	
Copper	Net tons	122,324	124,226	2	
Iron ore	Net tons	10,633,715	11,706 960	10	
Lumber	M. ft. B.M.	805,612	895,485	11	
Silver ore	Net tons	5	.....	....	100
Building stone	Net tons	6,249	4,670	...	25
Unclassified freig't (B)	Net tons	579,048	623,146	8	

(A)—Steamers 12,461
Sails 4,449
Unregistered 851
Total 17,761

(B)—Included in the item of unclassified freight is 2,601 tons of wool.

United States canal was open to commerce from April 21 to Dec. 10, 1897; 234 days. In 1898 it was open from April 18 to Dec. 14; 241 days.

The Canadian canal was open to commerce from April 21 to Dec. 14, 1897; 238 days. In 1898 it was open from April 11 to Dec. 9; 243 days.

Commerce passed through canals 238 days during 1897.

Commerce passed through canals 248 days during 1898.

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR FOR THE SEASON OF 1898, INCLUDING STATISTICS OF THE UNITED STATES AND CANADIAN CANALS AT SAULT STE. MARIE, MICHIGAN AND ONTARIO.

Items.	Designation.	Total Season's Freight, 1898. U. S. Canal.	Canadian Canal.	Total.
Vessels	Number	14,058	3,703	17,761
Lockages	Number	7,008	2,525	9,533
Tonnage, registered	Net tons	15 871,609	2,751,145	18,622,754
Tonnage, freight	Net tons	18,184,151	3,050,513	21,234,664
Passengers	Number	27,558	15,868	43,426
Coal, hard	Net tons	465,188	75,655	540,843
Coal, soft	Net tons	2,669,904	565,703	3,236,607
Flour	Barrels	6,917,025	861,018	7,778,043
Wheat	Bushels	52,693,452	9,646,544	62,339,996
Grain other than wheat	Bushels	22,950,940	3,127,444	26,078,384
Manufactured and pig iron	Net tons	237,150	13,020	250,170
Salt	Barrels	271,783	29,777	301,560
Copper	Net tons	118,403	5,823	124,226
Iron ore	Net tons	9,841,124	1,865,836	11,706,960
Lumber	M. ft. B. M.	885,176	10,309	895,485
Silver ore	Net tons	.....	.....	.....
Building stone	Net tons	4,670	.....	4,670
Unclass'd frt	Net tons	544,259	78,887	623,146

A recent official trial of considerable interest is that undergone at the mouth of the Thames by the Murakumo, the first of the six torpedo boat destroyers building by J. L. Thornycroft & Co. for the Japanese navy. Vessels of the Murakumo type, of which Thornycroft has recently furnished several to the British navy, are 210 feet in length, 19 feet 6 inches beam and 7 feet deep, with a mean draught of 5 feet 8 inches. The engines have cylinders 20, 29 and two of 30 inches diameter by 18 inches stroke. There are three boilers of the Thornycroft water tube type. The total heating surface is 11,500 square feet and the grate surface 200 square feet. On the trial the load carried was 35 tons, the steam pressure 210 pounds and the revolutions nearly 400. The mean speed on the six runs over a measured mile was 30.09 knots. The average horse power was 5,900, the steam pressure 205 pounds and the vacuum 24½ inches.

DOCKS AND CARS—PROBLEMS IN THE ORE TRADE.

Although vessels in the iron ore trade experienced considerable delay at upper-lake shipping ports during the past season, the problem of increasing, next year, the 1898 output of 14,000,000 gross tons of ore is not dependent particularly upon increased dock facilities at the shipping ports of Lake Superior and Lake Michigan. It is rather a question of mining labor in the Lake Superior country, better facilities at Lake Erie ports, and more cars on the railways operating between Lake Erie ports and the furnaces of Pittsburg and the Mahoning valley. When an output of 16,000,000 gross tons of ore is talked of for next year, the car question in Ohio and Pennsylvania, which was one of the great causes of restriction in output during the past season, must be taken into account. It is true that the railways engaged in this trade have all placed large orders for cars, and the manufacture of steel cars in the next few years will be conducted on an enormous scale, but in all calculations as to the business of the lakes next season it will be well to take into account the fact that two cars will probably be wanted in railway traffic generally for the one that can be built.

The only improvements of importance as yet talked of at Lake Erie ports are those projected by Carnegie interests at Conneaut, where a large tract of water front on the east side of the harbor is to be equipped with machinery as rapidly as possible, including an experimental plant of the Hulett kind, with which it is proposed to scoop up the ore from the holds of vessels by machinery, instead of shoveling it into buckets. The design of machine that is to be tried for this purpose at Conneaut was described and illustrated not long ago in the Review. It is now being built by Webster, Camp & Lane of Akron, and is to be erected on their account.

As already noted, the shipping docks at upper lake ports are fairly well up to requirements—more so, probably, than any other part of the ore transportation system—but some improvements are to be made in these docks. J. L. Greatsinger, president of the Duluth & Iron Range Railroad Co., has awarded to the Barnett & Record Co. of Minneapolis, the contract for tearing down and rebuilding ore dock No. 1 at Two Harbors. There were seven bidders for the contract, which must be completed by May 1, 1899. The new dock will contain 200 ore pockets, the original plans which contemplated but 192 having recently been changed. The dock will be 1,400 feet in length, 49 feet wide and 59½ feet in height. The dock proper, or without the end crib, will be 1,350 feet long. The aggregate capacity will be 40,000 tons, as against a capacity at present of 18,000 tons. The entire cost of the new dock, including dredging, will be $260,000. The Barnett & Record Co. last year rebuilt dock No. 2 at Two Harbors. Owing to the contour of the shore line the new dock will of necessity have eight pockets less than dock No. 2. It is claimed that with additional facilities afforded by this dock, the Duluth & Iron Range road will be able to ship 3,500,000 tons of ore next season, and if receipts from the mines are equal to expectations the figures might even reach 3.750,000 tons.

A report from Marquette is to the effect that the Duluth, South Shore & Atlantic Railroad Co. will in all probability rebuild during the winter its No. 3 dock at that port, making it a modern structure of about 55 feet height and of largely increased storage capacity. The work is expected to cost in the neighborhood of $200,000. The present No. 3 dock of the South Shore company at Marquette is the smallest of the several docks at that port, being only 37 feet high and having only 213 small pockets, with a capacity of 12,780 tons.

IMPROVEMENTS IN SHIP YARDS.

It is doubtful if there has been in the history of the American ship building a year more notable for the improvements made in ship yards than the one just closed. Reference has already been made at some length in the Review to improvements in the plants of the Bath Iron Works, the Gas Engine & Power Co. and Seabury & Co., Consolidated, of Morris Heights, N. Y., and other Atlantic coast concerns, and at the yards of the Chicago Ship Building Co., The American Steel Barge Co. and the Union Dry Dock Co. on the great lakes.

Now the Pusey & Jones Co. of Wilmington, Del., announce that they have completed extensions to their ship yard buildings which have been in progress for some time past. The marine railway at this yard has also been rebuilt and strengthened and additions made to the pneumatic equipment and to the machine shop plant. In the latter department the company is building and erecting a combined lathe and grinder for rolls, which when completed will, it is said, be as large as any in the world. It will be capable of both turning and grinding cast iron cylinders up to a size of 12 feet diameter by 16 feet in length, or down to a minimum of 6 inches diameter. The Pusey & Jones Co., in addition to the order for the ferryboat for the Port Richmond & Bergen Point Co., recently noted, have orders for an immense consignment of sugar machinery to go to Honolulu.

The new slip at the Cramps' yard at Philadelphia is about completed. Improvements at the yard of the Harlan & Hollingsworth Co., Wilmington, Del., of which mention has been made previously, include the erection of a large derrick and a rearrangement of the whole system of work. The railroad sidings in the yard have been rearranged and an additional set of launching ways, with a set of building ways parallel to them, completed. The Pedrick & Ayer Co. of Philadelphia recently shipped two pneumatic riveters to the Harlan & Hollingsworth yard and a considerable portion of the machinery equipment of the plant was furnished by the Hilles & Jones Co. of Wilmington, Del., who, it may be incidently mentioned, are busy on a big contract for ship building tools from the Yarrow Co. of Great Britain.

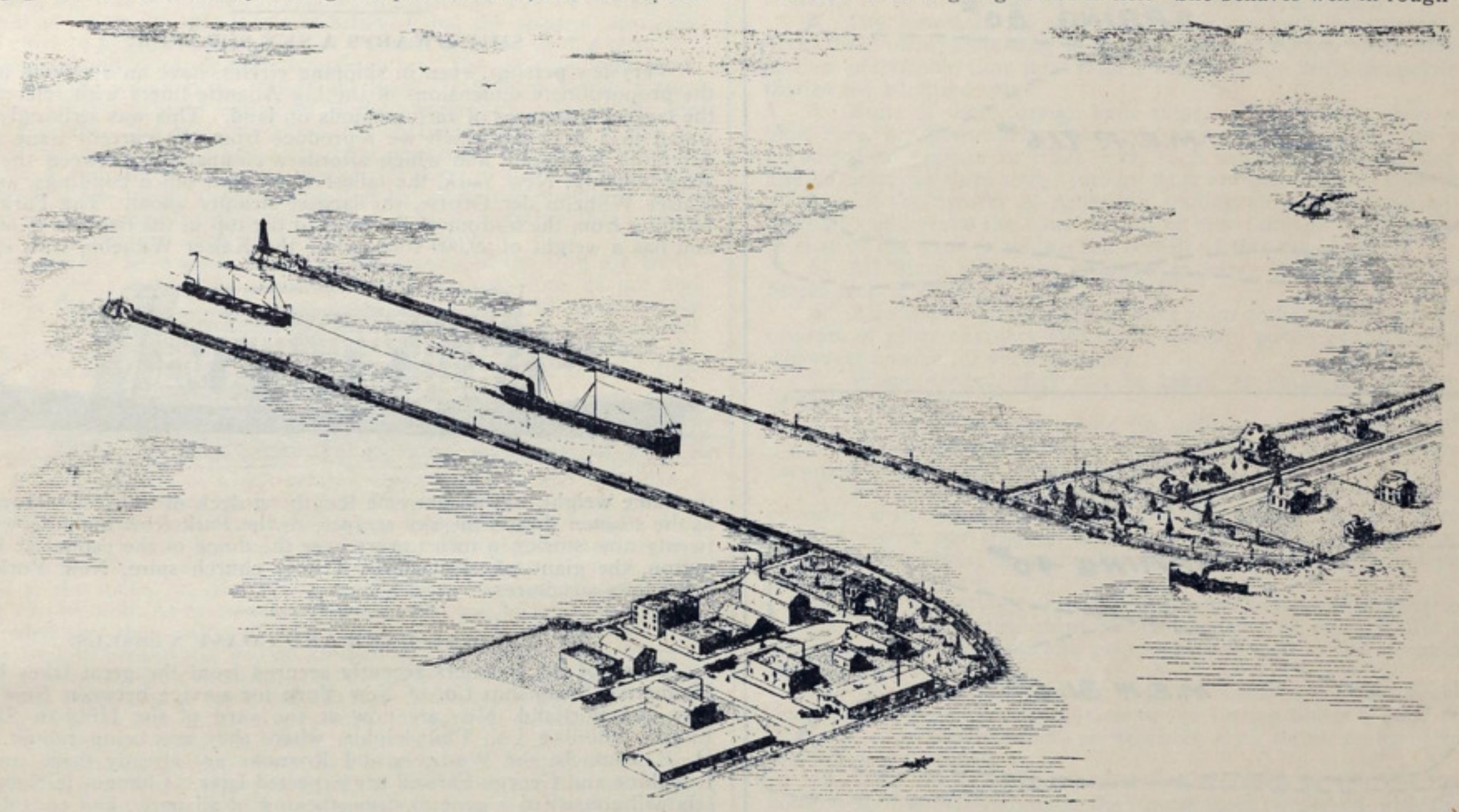
The steamers Ohio, Illinois, Indiana, Pennsylvania and Conemaugh, chartered by the government for war service, will be released Jan. 1, and it is stated that the Empire Transportation Co., owners of the vessels, will put them in the Japan and China trade.

Negotiations have been opened by the Russian government with the Vulcan Ship Building Co. of Stettin, Germany, and the Krupp Co. of Essen, Germany, with a view to the establishment of private ship yards by these companies in Russia.

CONCRETE WORK ON THE LAKES.

ITS USE IN BREAKWATER CONSTRUCTION AND IN PIERS—EXTENSIVE IMPROVEMENTS OF THIS KIND IN THE COLD REGION OF LAKE SUPERIOR.

A sketch on this page of the new Duluth canal (entrance to Duluth-Superior harbor) is from the 1898 report of Major Clinton B. Sears, United States engineer at Duluth, who is in charge of the improvement of rivers and harbors on Lake Superior, and whose district includes not only the important works at Duluth and Superior, but also the Portage Lake district, the harbor of Marquette and several other places in Michigan, Wisconsin and Minnesota. The piers shown in the engraving are a part of a project involving the expenditure of $3,080,553 and providing for 20 feet navigation, as against 16 feet not long ago, in this harbor, with improvement of entrances both at what is known as Duluth canal and at the natural, or Wisconsin, entry, which is near the city of Superior. These entrances permit of the passage of ships to and from the bays and river on which the two cities are located. Of late years the entire basin within these entrances has been regarded as practically one harbor. A large part of the appropriation referred to, which was secured under the continuous contract plan in the river and harbor act of June 3, 1898, is for dredging purposes, and deep channels in different parts of the harbor have already been secured from expenditures on that score, some eleven dredges being engaged almost constantly during the past summer, but the widening of the Duluth canal, or main entrance, is also an important part of the project, as will be noted from the sketch. Improvements at the Wisconsin entrance involve mainly the strengthening of the present piers with timber facing and stone riprap, preparatory to capping them with monolithic concrete superstructures. This kind of work has been going on in the rebuilding of piers and breakwaters in various parts of the lakes, where it was found that timber superstructures gave way so that it would be necessary to renew them every twenty or twenty-five years. But the building of the long new piers at the Duluth entrance is an entirely new job and one that will represent the best practice in work of this kind. One of them, the south pier, is well under way. Contracts for the pile and crib substructure, amounting to about $171,000, and for 686 concrete footing blocks, each weighing seven tons, are being carried out by King & Steele of Duluth. The concrete footing blocks are to be placed on top of the submerged cribs around their edges, but leaving a 2-foot berm, the tops of the blocks being above the water at all stages. Upon the upper faces and between the interior faces of opposite blocks the monolithic concrete work will be built in place. The blocks are made of American Portland cement, sand, and gravel (taken from the site), in the proportion of 16 pounds of cement to one-half cubic foot of sand and 1 cubic foot of clean gravel. The mixing is done by hand and the concrete is deposited in the molds by shovels and then rammed in 6 inch layers. Molds are kept on the blocks for at least twenty-four hours, and no block is moved from the platform to the storage yard until it has stood twelve days.



NEW DULUTH-SUPERIOR HARBOR ENTRANCE—DULUTH SHIP CANAL.

In the Review of April 28, 1898, extended reference was made to the rebuilding of the breakwater at Marquette, where a concrete superstructure is to be provided for the full length of 3,000 linear feet. About 1,000 feet of this superstructure, begun in June, 1895, is completed. The working season in the cold Lake Superior region is, of course, very short, especially for concrete made in place. In the article dealing with the work at Marquette, two or three photographs were reproduced showing the condition of the breakwater during the winter period, when the thermometer in various parts of the Lake Superior country drops to 10 or 15 degrees below zero, or even lower temperatures. Major Sears' report contains a few more views of this kind, and will be found interesting from an engineering standpoint on account of the extensive use of concrete under his direction, and in view also of the severe storms and great extremes of climatic conditions on Lake Superior.

CRITICISM OF LAKE VESSELS.

Lake vessel men will be amused by the criticisms which have been freely passed upon the steamer Simon J. Murphy, recently taken to the coast by the Atlantic Transportation Co. and now being overhauled at Simpson's dry dock, East Boston, Mass. The Murphy is not, of course, a representative steel vessel of the lakes. She was, in fact, one of the very small cheap ships of the steel fleet. New England vessel men, who have been sitting in judgment on her declare that one of her worst features is found in the fact that the "main boiler is on deck without any extra supporting stanchions under it." They also find fault with the fact that there is no means of steering the vessel by hand, and claim that if the steam steerer were to become disabled in a storm the vessel might be in serious peril. Another feature of the steamer with which they find fault is "a hawser hole in the stern." They claim that in heavy weather at sea there would be danger of water pouring through this hole, over the steering engine and into the engine room.

The new chief engineer of the Murphy, who shipped at Halifax, is not, however, in sympathy with any of these complaints. He is quoted as saying: "The Simon J. Murphy in my estimation is seaworthy and I have no fears in going to sea in her. She behaves well in rough weather. Lake seamen are, of course, unused to the heavy seas encountered on the Atlantic coast and they were somewhat frightened on the trip to Boston. The vessel has sustained no damage. She is in dry dock in East Boston to have copper paint applied to her bottom. The only change needed in the machinery is the substitution of surface condensers for the jet condensers. I believe this type of vessel is all right for coastwise traffic."

DEATH OF CHARLES HILLMAN.

The already long list of deaths during the year of men prominently identified with the ship building industry was lengthened by the demise on Thursday, Dec. 22, at his home in Philadelphia, of Charles Hillman, president of the Charles Hillman Ship & Engine Building Co. His death, which came very suddenly, was due to an attack of the grippe, followed by paralysis. Mr. Hillman was a native of Philadelphia, and was born May 9, 1823. He learned the trade of ship carpenter and formed a partnership with D. V. Streaker for the building of sailing vessels. The firm continued as Hillman & Streaker until early in the sixties, when Jacob Birely was taken into partnership and a new yard secured, the partnership continuing until 1888 when Mr. Hillman purchased the interests of his partners and continued the business under the name of the Charles Hillman Co. In 1891, when was begun the construction of iron and steel vessels, the present company was incorporated. Three of Mr. Hillman's four sons, Bartholomew G., Josiah and Jonathan J., are associated in the management of the plant.

Newspaper dispatches from San Francisco accredit R. P. Schwerin, vice-president of the Pacific Mail Steamship Co., with the statement that his company has placed an order with the Newport News Ship Building & Dry Dock Co. for two steamers, each of 10,000 tons burden and capable of maintaining a speed of 18 knots.

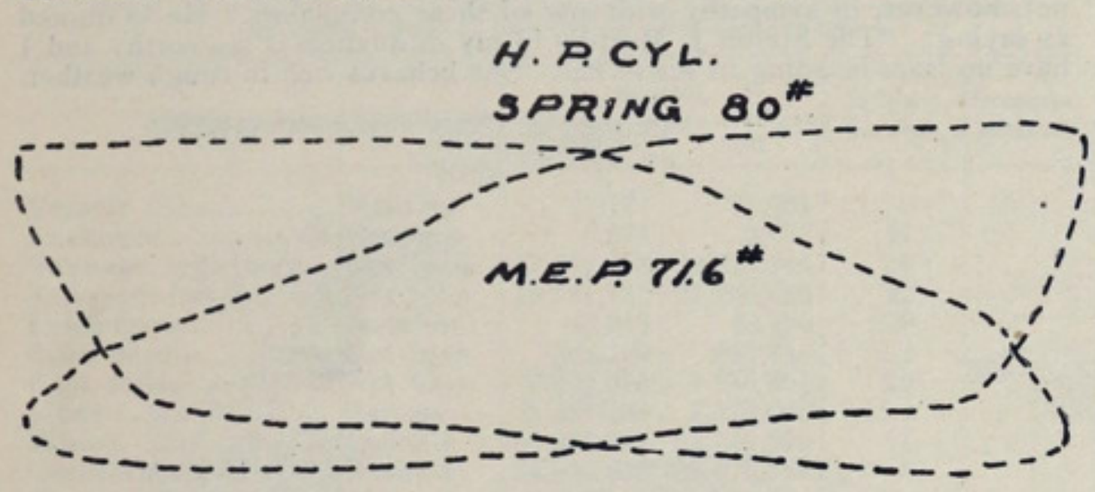
The Teagan Co. has been incorporated at Detroit with an authorized capital of $50,000 and a subscribed capital of $30,000, by John O. Teagan, W. T. Teagan and Wade Mills. The incorporators of this company are vessel owners and are placing their interests in a stock company.

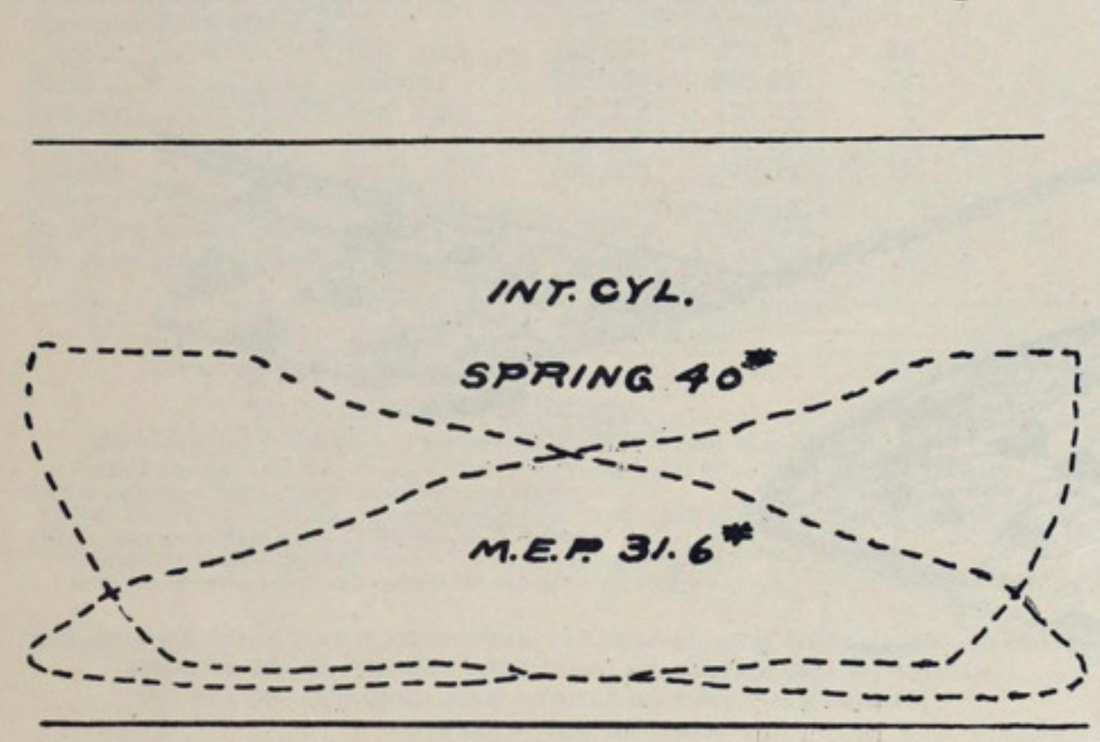
TEST OF ANOTHER MODERN FREIGHTER.

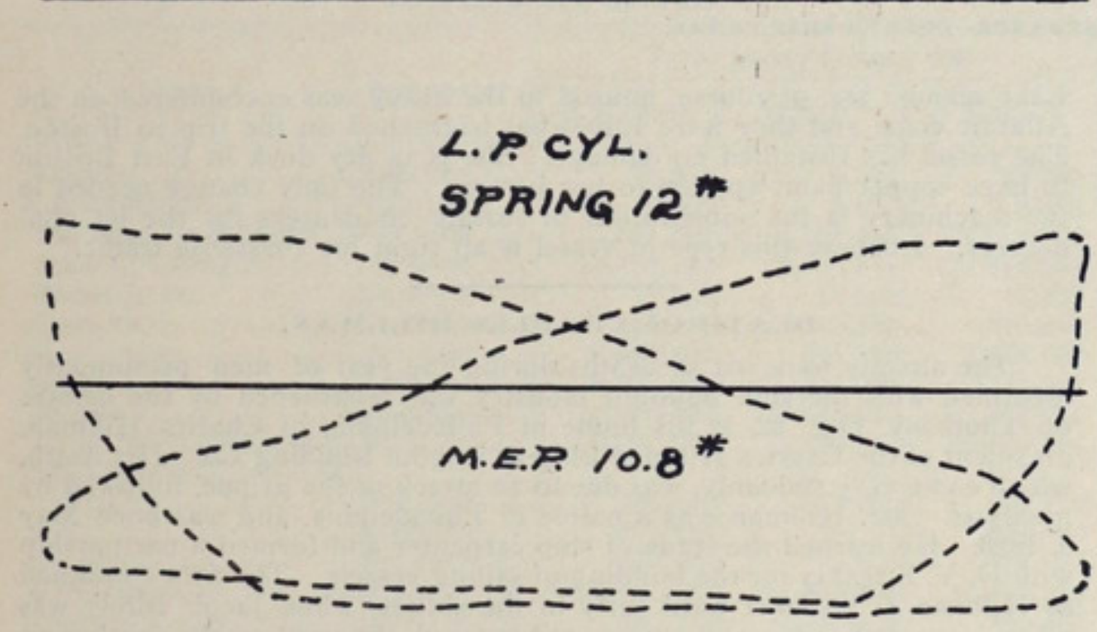
A STEAMER THAT MOVES 6,800 TONS OF CARGO AT 12¼ MILES AN HOUR ON A CONSUMPTION OF 1.46 POUNDS OF COAL PER INDICATED HORSE POWER PER HOUR—TRIALS OF THE C. A. BLACK.

Detroit owners of the steamer C. A. Black—6,800 net tons capacity—think they have the most economical freight carrier in this or any other country. They have just given out particulars of a test that shows a consumption of only 1.46 pounds of coal per indicated horse power per hour, and they point to the fact that the vessel, which did not go into commission until Nov. 2, made three round trips to the head of Lake Superior, taking coal up one trip and bucking considerable ice during her last voyage, on the purchase for the entire period of only 631 tons of coal. The success of the Black is attributed to the claim that her power—boilers, proportion of engine cylinders, and wheel—was made to harmonize with the ship, and in addition she was provided with Howden hot draft.

"We were confident," said Mr. C. B. Calder, in discussing trials of the Black, "that we had everything, both in the power and in the relation of power to hull, in such shape in designs of this vessel that we were to get the very best results, especially with the use of the Howden draft appliances. Sizes of engines and valves are so arranged that no matter







what engineer runs the vessel, the amount of coal consumed will be limited to the very low figure shown in this test, with the speed of the ship also limited to about 12¼ miles an hour, and when worked at this speed the best results are obtained from both engine and boiler. The first report we had from J. O. Snyder, engineer of the vessel, and who is one of the best men on the lakes, gave particulars of a test made Nov. 27. The fuel consumption was down to 1.40 pounds. I wrote him it was too good to be true. His men had probably erred, I said, in weighing the coal. We were anxious to have the real facts, and he was to put a man in the fire hold to weigh the coal and another man to watch him, with a little extra pay for careful work and with instructions to clean fires during the test. Then he gave us the trial that is now reported, that of Dec. 9, between Detour and Thunder Bay. But in doing this he took back no part of his report regarding the previous trial. 'We made no mistake,' he said, "in the first test. The coal was carefully weighed. I can do the same thing again with good coal, and I have men with me who also say we can do it. But as you request it, I am sending you report of a second test. This time we had poorer coal. There was lots of slack and no heat but a great deal of ashes and dirt.' "

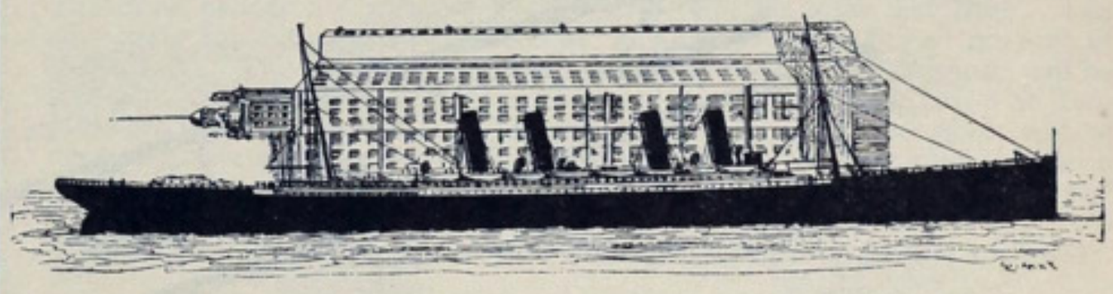
A summary of the second trial, with cards from the engines, is as follows:

Particulars of vessel—Hull, 414 feet over all, 50 feet beam, 28 feet depth; load, 215,000 bushels of wheat; draught, 16 feet 8 inches forward and 17 feet 5 inches aft, leaving Duluth; engine, triple expansion, with cylinders of 22, 35 and 58 inches diameter and common stroke of 40 inches; air pump, 32 inches diameter and 14 inches stroke; two Scotch boilers, 13 feet 2 inches diameter and 12 feet over all, allowed 165 pounds pressure; four furnaces, 48 inches inside diameter with grates of 5 feet 6 inches—88 square feet; total heating surface, 4,292 square feet; ratio of heating surface to grate surface, 48.7; fan wheel for Howden draft, 66 inches diameter, with 34 x 34 inch discharge; fan engine, 7 x 7 inches; heating surface in tubes of heater, 100 square feet; sectional, four-bladed propeller, 13 feet 6 inches diameter and 14 feet pitch.

Report of test—Steam pressure, 165 pounds; vacuum, 22 inches; average revolutions, 87.7; indicated horse power, H. P. cylinder, 482.3; I. P. cylinder, 538.5; L. P. cylinder, 505.8; total average, 1,526.6; ref. M. E. P. to L. P. cylinder, 32.7; ratio of horse power to grate surface, 17.3; ratio of heating surface to horse power, 2.8; duration of test, 6 hours 2 minutes; total coal burned, 13,440 pounds; coal per hour, 2,228 pounds; coal per hour per I. H. P., 1.46 pounds; coal per hour per square foot of grate surface, 25.32; air pressure at fan, 1⅛ pounds; temperature at hot well, 139°; temperature of feed water after leaving heater, 175°; speed of vessel, 12.23 miles; speed of propeller, 13.95 miles; slip of propeller, 23.3 per cent.

SHIP DWARFS A SKY SCRAPER.

Very few persons, even in shipping circles, have an adequate idea of the proportionate dimensions of the big Atlantic liners with reference to the largest structures of various kinds on land. This was strikingly illustrated in a drawing which we reproduce from the current issue of the Scientific American, and which affords a comparison between the Park Row building, New York, the tallest of modern office buildings, and the Kaiser Wilhelm der Grosse, the largest steamer afloat. The Park Row building from the bottom of the piles to the top of the flagpole is 501 feet and has a weight of 20,000 tons, while the Kaiser Wilhelm, with exactly



the same weight, has an extreme length on deck of 649 feet. Moreover, as the steamer dwarfs the sky scraper, so the Park Row building with its twenty-nine stories in turn towers over the dome of the capital at Washington, the giant wheel at Paris, Trinity church spire, New York, and other lofty structures.

REBUILDING LAKE AND COAST VESSELS.

Three of the steamers recently secured from the great lakes by the Manhattan Steamship Co. of New York for service between New York City and Portland, Me., are now at the yard of the Hillman Ship & Engine Building Co., Philadelphia, where they are being rebuilt. The H. E. Runnels, the Westover and Roanoke are already there, and the Josephine and George Farwell are expected later. Changes in these vessels will consist of a general strengthening of all parts, and considerable rebuilding of joiner work. The 'tween decks, which were open, are being floored over, and above this a long row of staterooms and quarters for the officers are being added. What was formerly an open deck will now be used for freight and will be entirely cut off from the weather.

An interesting piece of reconstructive work is in progress at the yard of the Neafie & Levy Ship & Engine Building Co., Philadelphia, where the tank steamer Allegheny, owned by L. Luckenback of New York, is rebuilding. The vessel was sunk in the Delaware some years ago, turning completely over. After considerable difficulty she was gotten back to an even keel, and now the Neafie & Levy Co. has made about as complete a job of remodeling as it is possible to imagine. The vessel has also been provided with electric lighting apparatus.

The Robert Palmer & Son Ship Building Co. of Noank, Conn., has just closed a contract with the Philadelphia & Reading Railroad Co. for eight large ocean-going barges, which are to cost $30,000 each. The date for their completion is set at Oct. 1, 1899. The Palmer company has also just secured an order for a 240-foot railroad float for the Harlem Transfer Co. and consequently has work on hand to keep 500 men busy for about eight months.

According to press dispatches, Townsend & Downers, shipwrights of New York city, who recently purchased for $80,000, Shooter's island at the mouth of Newark bay, opposite Erastin, L. I., intend to utilize the island, which has an area of seven acres, for ship building purposes.

Glasgow newspapers have been stirred up over the arrival there of 1,000 tons of ship plates from Norfolk, Va., especially in view of the fact that the steamer which carried them was flying the American flag.

Secretary of the Navy Long will, in accordance with the decision of the board of construction, issue advertisements shortly for bids for raising the battleship Maine and the Spanish cruiser Cristobal Colon.

Holiday excursion tickets via the Nickel Plate road are on sale Dec. 23, 24, 25, 26, 30 and 31, 1898, Jan. 1 and 2, 1899, and are good returning to and including Jan. 3, 1899. With their splendid train service and low rates the Nickel Plate road adds a pleasing feature to the enjoyment of holiday travel.
275, Dec. 31

BUFFALO'S PROUD BOAST.

THE GREAT GRAIN PORT OF THE WORLD—TWO HUNDRED MILLION MARK AGAIN PASSED—A BRIEF SUMMARY OF THE SEASON'S RECEIPTS.

Buffalo, Dec. 28.—With the departure, during the past few days, of all the boats that are to lay up at Ohio ports, the season of navigation at Buffalo is at an end. It has in most respects been a notable one, though in some cases in its failures as well as its successes. The success has been in grain handling. In 1897 the amount reached an even 200,000,000 bushels. (not including flour), having increased about 19 per cent over the season previous. This was achieved by the wonderful size of the oat crop, which exceeded in bushels received either wheat or corn, being 64,000,000 to only 56,000,000 each of wheat and corn. This season the entire amount has been about 214,000,000 bushels of all grains, with wheat far in the lead and oats badly fallen off. The constant war of the rail lines has cut down the amount of flour, making us more than a million packages short of the proud 12,000,000 of 1897.

The great failure has been in the elevator business. Internal dissensions, said to be chiefly due to the refusal of the Kellogg elevator to come to any sort of terms, and this added to the indifference of the rail and western houses, drove rates down to a mere nothing at the opening of the season. It is doubtful if any harbor elevator has taken in enough as net earnings this season to pay running expenses and taxes. It is said that the New York Central elevators have handled 50,000,000 bushels of grain alone, but this will have to remain unofficial and may be overstated. The worst of all this is that it is not believed that the wanton throwing away of close to $2,000,000 has attracted a bushel of grain to this port.

As to the grain blockade there is little to say. The car supply gave out and that was the whole case. There has been a call from certain Canadian sources for a general voting of Buffalo incompetent to handle the grain of the lakes, but this was as plainly an inconsiderate as it was an interested demand. Buffalo has a canal and five trunk lines of railroad to the seaboard, running in all twelve tracks. If there is any port elsewhere that can boast one-fourth these facilities let her claim the business. With elevators of the capacity of those in Buffalo harbor it is after that a mere matter of keeping them from filling up.

Reference has been made before to the growth of the iron ore trade. Buffalo handled considerably more than 900,000 gross tons of ore and Tonawanda 234,000 tons. Both ports failed to obtain an adequate supply at that. For a port that lays no particular claim to the iron trade this showing is certainly of a creditable kind. The growing demand for Lake Superior ores east of the Alleghenies is, of course, bound to help Buffalo.

There was another notable failure in the management of the canal and a very aggravating one it turns out to be, for a great part of the early season was frittered away by a late opening, followed by a succession of breaks, till the shippers of wheat refused to patronize it, and less than a dozen wheat cargoes were taken for tide-water during the whole season. The whole amount of grain carried was less than 25,000,000 bushels. Just now the canal men are showing considerable activity and are preparing to demand that when the state sets to work on canal improvement again it begin at the locks, so that a new model boat, carrying about 20,000 bushels, can be built. As matters are now no boats can be built, as it is not known what size they ought to be.

The Buffalo breakwater will be finished in two seasons more, according to the plans of the contractor. About 2,400 feet of the timber crib work at the south end is done and 300 feet of the stone portion. When done there will be four miles of structure, the longest in the world, and capable of hiding probably the whole lake fleet at a time.

The shipment of coal has more than held its own, largely on account of the growth of soft coal shipments and the establishment of a car dumping machine of the latest model on the docks of the Rochester & Pittsburg Company. The amount, 2,455,000 tons, is more than that of either of the past two seasons. As a rule the receiving ports up the lakes show a pretty uniform increase of amount, indicating a normal and healthy growth of the trade.

EXAMINATION FOR SHIP DRAUGHTSMEN.

There are a number of places for ship draughtsmen and assistant ship draughtsmen at various yards in this country to be filled soon by persons receiving high percentages in competitive examinations to be held under the direction of the United States Commission in cities where there is a board of examiners. Ship draughtsmen will receive in most cases $5 a day and assistants $4 a day. The examinations will begin Feb. 7 and last four days. All persons who desire to compete should at once write to the United States civil service commission, Washington, for application blanks (forms No. 304 and No. 375), which should be properly filled and promptly forwarded to the commission at Washington.

The Newport News Ship Building & Dry Dock Co. has just awarded to the Brown Hoisting & Conveying Machine Co. of Cleveland, the contract for a second electric cantilever crane. The new crane will be in most respects similar to the one for which the Newport News company gave the Brown company the contract some weeks ago, save that it will be larger; it will, indeed, be the largest in the world, having a length of almost 800 feet.

The United States revenue cutter Manning, built by the Cramps, has returned to Boston after making a most creditable record as a member of the auxiliary fleet during the war. She frequently developed a speed in excess of 18 knots while carrying dispatches.

Twenty-five of the thirty-eight steamers purchased by the United States navy department during the war with Spain were built abroad. Of twenty-six yachts also purchased by the department, five were built in foreign yards.

Higher costs of ship building in Europe are indicated by the report that a Glasgow firm recently netted $50,000 on the sale of a 6,800-ton steamer building on the Clyde.

SUBSTANCE OF THE SHIPPING BILL.

A CLEAR AND CONCISE STATEMENT OF THE PROVISIONS OF THE HANNA-PAYNE MEASURE TO PROMOTE COMMERCE AND INCREASE THE FOREIGN TRADE OF THE UNITED STATES.

What are the provisions of the Hanna-Payne shipping bill? This question will be asked repeatedly when the measure comes up for consideration shortly in congress. It is a matter of as much importance as the policy of expansion resulting from the war, or the Nicaragua canal bill, now before congress. The bill was printed in full in the Marine Review, but there is always considerable difficulty in learning the scheme and main points of such a lengthy measure when it is read in the form that contains a large amount of legal phraseology. The substance of the bill may be stated as follows:

1. In order to obtain the earliest possible action pursuant to the policy of the United States above referred to, the bill provides for bringing under our flag and the protection of our laws the few foreign-built ships now actually owned and contracted for by American citizens, and in which and in their trade American capital has been and is actually invested. These ships have been built and their trade established under a foreign flag, because the ships could not be built and fitted out here and operated at a cost that would enable them, successfully, to compete with the ships and trade of foreigners, aided as they have been, are, and will continue to be in various ways, by their own governments.

2. The American registry of these foreign-built ships is conditioned upon their owners building here and putting into our own trade at the earliest practicable time new vessels of a tonnage fairly proportionate to that of the admitted ships.

3. None of these foreign-built ships, or of the new ships so to be built here, are permitted to engage in our coasting trade; but they are permitted to engage in trade with such other ports belonging to the United States as ships under foreign flags are permitted to trade with.

4. All the owners of American trading ships now existing are required to undertake the construction of new tonnage fairly proportioned to that of the ships claiming the benefit of this act.

5. All these ships are required to carry the mails of the United States free of charge.

6. All the new ships must be built so as to be readily converted into cruisers or other auxiliary aids to the military power of the United States whenever needed for such purposes.

7. When needed, they can be taken or employed by the United States at any time.

8. All these ships are bound (in addition to the indispensable training of their crews) to constantly educate and train American boys for the various necessities of naval operations.

9. All the foregoing mentioned conditions and requirements being complied with, American vessels are to be aided and assisted in regaining and increasing our trade to distant ports by a compensation graduated (with one exception) upon the distance sailed and upon the size and speed of the ships.

10. The exception referred to in the last paragraph applies to sailing vessels and to slow steamships, the maintenance of which is also essential to our maritime progress and prosperity and also to the strength of our military power.

11. Vessels engaged in the deep-sea fisheries are also provided for upon the same policy of supplying to the United States a body of intelligent and experienced American mariners at all times, ready to serve our country when needed.

12. The respective compensations arranged in the bill have been computed, it is believed, upon the lowest basis consistent with the attainment of the great and urgent objects already stated.

RETIREMENTS IN THE NAVY DURING 1899.

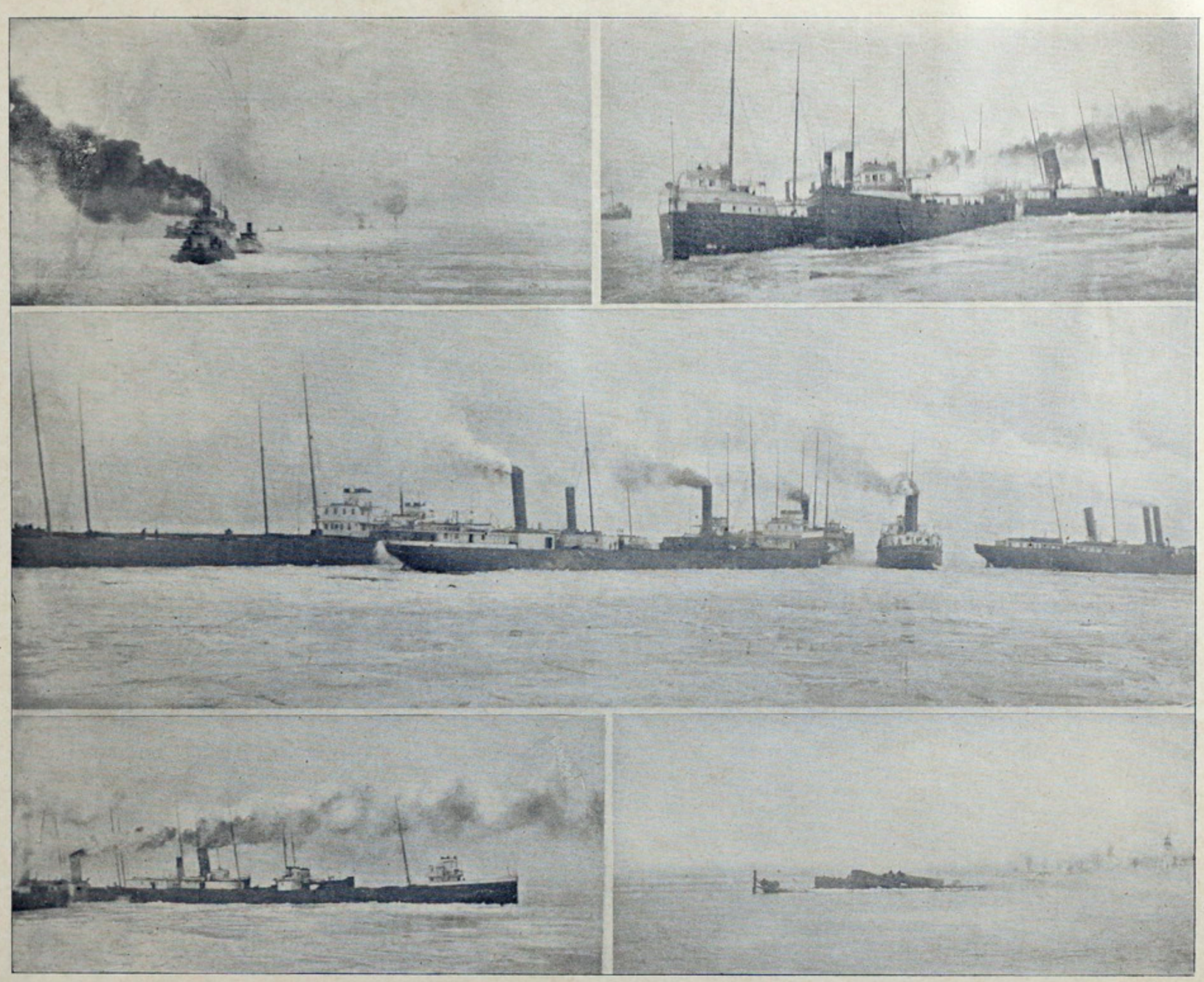
The following retirements on account of age will take place in the United States navy during the year 1899:

Feb. 10, Chief Engineer George J. Burnap; Feb. 10, Mate Charles Wilson; March 17, Boatswain William Manning; March 25, Chief Engineer William G. Buehler; April 7, Medical Director George A. Bright; April 9, Pay Director Rufus Parks; April 16, Medical Director John H. Clark; May 2, Boatswain Charles Miller; May 5, Pay Director Edwin Stewart; May 7, Pay Inspector George W. Beaman; May 22, Professor Edgar Frisby; July 8, Chief Engineer James Entwistle; July 11, Chief Engineer Albert C. Engard; August 5, Naval Constructor Joseph Feaster; Aug. 29, Boatswain Charles E. Hawkins; Sept. 1, Pay Director Joseph A. Smith; Sept. 15, Paymaster William W. Barry; Sept. 25, Chief Engineer Joseph Trilley; Sept. 26, Mate William Jenney; Dec. 10, Gunner George Fouse; Dec. 14, Chief Engineer Charles J. MacConnell; Dec. 15, Boatswain William A. Cooper; Dec. 17, Professor William Harkness; Dec. 17, Gunner Robert Sommers; Dec. 23, Pay Director George A. Lyon; Dec. 26, Rear Admiral George Dewey.

Although several vessels were placed immediately after the close of navigation to store corn at Chicago and deliver it at Buffalo in the spring at 2¼ cents, the market already shows improvement, and vessel owners who have capacity to offer on Lake Michigan are confident that the scarcity of ships, due to a big fleet being held up at Lake Erie ports, will result in higher rates. Most of them say they will hold their vessels for 3 cents on corn, in view of the present outlook.

Leander Burdick, vessel owner of Toledo, has received an inquiry from a Boston capitalist for a lake vessel to be chartered for service in the coal trade between Cape Breton and Boston. The boat, which must have a capacity of from 2,000 to 2,500 tons, will be needed for at least two seasons.

Contracts now on the books of the Roach ship yard, Chester, Pa., aggregate between $1,300,000 and $1,400,000, and the weekly pay roll is about $11,500, the largest that the establishment has had for many years.



PHOTOS BY ALVORD & CO., DETROIT.

VIEWS OF THE ICE JAM DURING CLOSING DAYS OF NAVIGATION ON LAKE ERIE, SEASON OF 1898.

Some 100 vessels were either caught fast in great fields of ice below the Detroit river, Lake Erie, or prevented from passing up or down for ten days in the early part of December. They were released by car ferries and tugs at an expense aggregating $15,000 to $18,000. Among vessels included in the above views are the steamers I. W. Nicholas, Neshoto, Olympia, Globe and Senator, as well as whalebacks, the tug Mason and one of the car ferries. In the lower right hand corner is the wreck of the steamer Aurora, sunk and burned near Bois Blanc Island, Detroit river.

CAUSTIC CRITICISM OF A UNITED STATES TRANSPORT.

A pretty scathing criticism of the condition of the engines, boilers and auxiliaries on a number of steamers until recently in the transatlantic service, has been made by Mr. Eugene Betts of New York City, who acted as resident inspector during the fitting out of one of the vesels as a permanent transport. His denunciations are not launched so much against the government for the purchase of these vessels as against an economical policy on the part of the former owners, which would force its engineering department to make so disgraceful a showing. Mr. Betts takes the vessel whose refitting he superintended as a fair example of general conditions in this particular fleet and in discussing her condition says:

"It is a modern, twin-screw, steel steamship, 445 feet long by 49 feet beam and 39 feet deep; draft on load water line 26½ feet; six athwartship bulkheads and double bottom throughout. She has two single and two double-end Scotch boilers and two triple expansion engines of the fore-and-aft type—that is, three cylinders, each working on its own crank. The piston rods of the intermediate and low pressure engines extend up through the cylinder head, and these tail rods were the most noticeable objects to one entering the engine room. They were so badly cut and fluted that it is hard to see how the ship had run at all, so difficult it must have been to keep any packing in the stuffing boxes. On close examination, nearly all the piston rods and valve stems were found in a varying degree in the same condition, and all had to be turned down to permit the stuffing boxes being packed with metallic packing. This turning down was considerable; one rod for instance, was reduced in diameter from 4 to 3½ inches.

"The valves of the high pressure engines are of the piston type, the others being slide valves. These piston valves were found on removal to be rusted on their faces, showing that the steam had blown freely around them for a long time, and the slide valves were very badly cut in grooves and furrows over ⅛-inch in depth. Another noticeable feature which was an index to the apparent character of the previous maintenance of the ship, was the condition of the bearings of the valve gear rock shafts on each engine. These bearings contained an upper and a lower brass, which, in the course of time, had worn away until the bearing was 'brass bound'; instead of relining these brasses or properly taking up further wear, a wooden stick had been driven in between the shaft and the upper brass of each bearing. To all appearances these bearings had been in this condition for many months.

"Among the auxiliaries the condition of things was very bad. The boiler feed pumps were unfit for any use and the water piston of the principal pump was so much smaller than its cylinder that a large pocket knife blade could be run all around between it and the sides of the cylinder. In the boiler room probably a little more attention had been given to proper maintenance, as the boilers had been kept fairly clean inside; but some of the boiler mountings, such as drain valves, and some of the stop valves, were so badly corroded that they could be neither opened nor closed without destroying them. Connecting the bilges of the various compartments are gates or sluices in the bulkheads at each side of the ship worked by rods running up to the spar deck. Connected to each of these bilges is a hand pump. Neither the sluices nor the pumps were in working condition, and, to all appearances, no attempt had ever been made to keep them in order. The tanks in the double bottom, with the exception of the engine tank-head, evidently had not been cleaned for a long time and probably never. The manhole covers had certainly not been removed within a year. Beneath the ceiling the lower holds were foul with decaying grain, the odor of which filled the lower decks and hold of the ship."

FOURTH PRINCETON IN OUR NAVY.

"The United States composite gunboat Princeton is the fourth to bear the name in the United States navy," says the Army and Navy Journal. "She is of 1,000 tons displacement, is of composite construction with her wetted surface coppered, is furnished with engines of 800 indicated horse power, has a single screw and carries a battery of six guns. The first craft to bear the name was built in Philadelphia in 1843, after the hull designs of Captain R. F. Stockton, U. S. N. The machinery and boilers were designed by the late John Ericsson, and built by the well known firm of Merrick & Towne of Philadelphia. The hull was built by John Lenthall, who afterward became chief of the bureau of construction and repair. This Princeton was the first ship fitted with a screw propeller in the navy, and her cost, complete in all respects was $212,615. The second of the name was fitted with engines and boilers designed and built by the venerable Charles H. Haswell, and is recorded as having 'performed remarkably well under steam and canvas.' No. 3 was built at Boston, launched in 1851, cost a total of $259,460, and her engines were designed by John Ericsson, her boilers by Benjamin F. Isherwood, late chief of the bureau of steam engineering, her hull by Samuel H. Pook, U. S. N. The machinery was built by Murray & Hazelhurst of Baltimore, Md. This craft was far from being the success anticipated, and having failed to come up to expectation as a cruiser, was first laid up in ordinary at the Norfolk navy yard and afterward, having been divested of her boilers and machinery, was commissioned at Philadelphia as a permanent store and receiving ship. Remaining here until 1866, the Princeton was surveyed, condemned and sold, and so the name disappeared from the navy list until 1896, when the present vessel takes up the name and renews the fame of the historic forerunner of the modern screw navy."

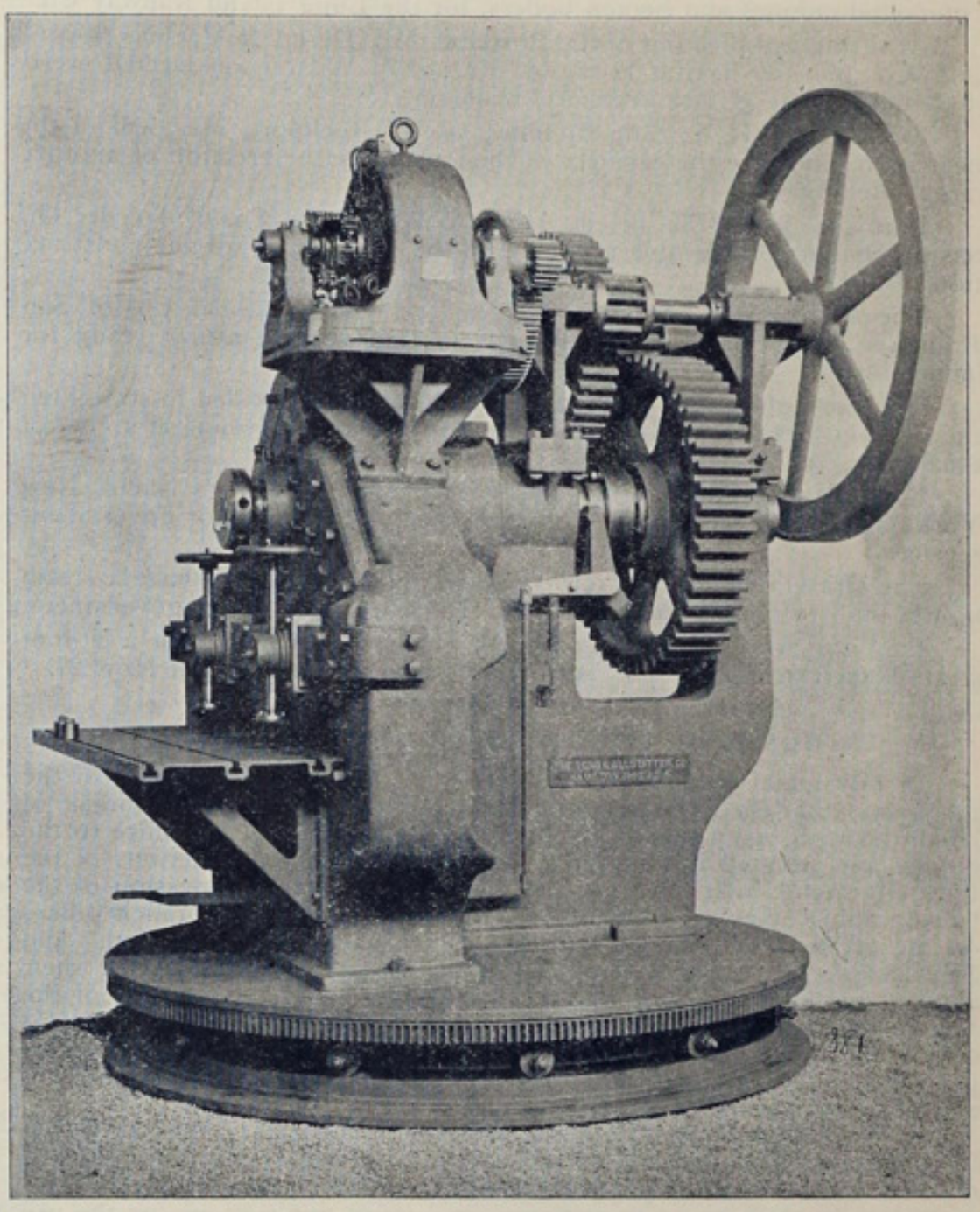
The sea-going tug Robert W. Wilmot, built by the Globe Iron Works Co., Cleveland, for W. G. Wilmot & Co. of New Orleans, and which made the trip to New Orleans by way of the Welland canal, St. Lawrence river and the Atlantic and gulf coasts, arrived at her destination on Dec. 12. She left Cleveland Oct. 15, and encountered numerous severe gales on the Atlantic. When off Cape Hatteras she touched Diamond Shoal lightly, but got off without material damage.

At a dinner recently tendered to Clement A. Griscom, president of the International Navigation Co., by William L. Elkins, the guests included Thomas B. Reed, speaker of the house of representatives; Rudolph Ellis, A. J. Cassatt, Col. A. Loudon Snowden, Thomas Dolan, P. A. B. Widener, Sidney Tyler, William L. Elkins, Jr., and Harry Payne Whitney, H. H. Freeland, H. H. Rogers and Thomas F. Ryan of New York.

SWIVELING ANGLE-IRON SHEARING MACHINE.

The accompanying half-tone gives an excellent view of a new angle iron shear, which embodies some new features, and which has just been brought out by the Long & Allstatter Co. of Hamilton, O. In cutting up angle iron for structural purposes it is often necessary to cut it at a miter or other angle, and this machine is designed to make these cuts as readily as square ones.

The table in front of the shear blades will be seen to be provided with adjustable gauges for determining the angle to be cut. One leg of the angle shear blades will be seen to be vertical and the other horizontal, the iron being cut thus lying with one leg flat on the table against the gauge at one point and against the shear blade at another, while a swiveling adjustable clamping screw enters the angle and holds it securely in position, crowding it both against the stops and against the work table.



SWIVELING ANGLE-IRON SHEARING MACHINE.

It is clear that with a stationary machine the adjustment for different angles of cut would necessitate a large fan-shaped space in front of the machine, which would not only consume valuable space but would involve extra handling of the stock. To avoid this the entire machine is mounted upon a turn table, and by a pin and crank on the side opposite to the one shown, the machine may be so turned that the stock shall occupy the same position regardless of the angle at which it is being cut.

A pilot wheel, seen in front of the machine, serves to operate the cam shaft by hand in setting the shear blades, while an automatic stop insures that the machine shall always come to rest with the shears open. The machine is obviously adapted to cutting both right and left hand, and is made in seven sizes adapted to the full range of sizes of angle irons. The motive power shown in the picture is an electric motor, which is now so popular in structural iron works for this class of work, but a steam engine is supplied in its place when preferred.

THE LAKE-BUILT REVENUE CUTTERS.

Dispatches from Washington state that the revenue cutters Algonquin and Onondaga, built by the Globe Iron Works Co., Cleveland, and taken to the coast during the war, will not be assigned to duty in Cuban and Porto Rican waters as had been anticipated. The reason given is that wooden vessels, of which the revenue cutter service has several in commission, are believed to be better adapted to service in the West Indies, by reason of the fact that they will be free from the danger of corrosion which would be present in the case of steel vessels. It is announced that the Algonquin will be assigned to patrol duty on the Atlantic coast between New York and Cape Hatteras, and that the Onondaga will be engaged in similar service north of New York, principally off the Massachusetts and Rhode Island Coasts. The Algonquin is now at Philadelphia and the Onondaga at Boston, and both have just been inspected by Capt. Collins, engineer in chief of the revenue cutter service, who made arrangements for their final outfitting, preparatory to their being placed in commission.

The North German Lloyd Co., after paying $1,000 for a model of the steamer Kaiser Wilhelm der Grosse, has discovered that the designer of the miniature vessel has made a copy accurate in every detail, save that he has omitted the whistle.

SOME SHIP YARD CONTRACTS.

The Burlee Dry Dock Co. of Port Richmond, S. I., and Kelly, Spear & Co. of Bath, Me., have just secured contracts from the Block-Sheridan-Wilson Coal Co. of Baltimore. The Burlee Co. will build a 142-foot tug for the Baltimore concern, while Kelly, Spear & Co. will at once begin work on a barge.

The Hickman, Columbus & Cairo Packet Co. of Cairo, Ill., with a capital stock of $5,200, has been incorporated for transportation business on the Ohio and Mississippi rivers, by Hubbard James, Benjamin McMahon and John A. Crench.

The Neafie & Levy Ship & Engine Building Co. of Philadelphia has secured the contract for a 112-foot steel tug boat with 700 horse power, compound engines and Scotch boilers, for the Long Island Railway Co.

At the annual meeting of the Portland, Mt. Desert & Machias Steamboat Co., recently held at Portland, Me., F. A. Wilson was elected president and George F. Evans general manager.

The S. E. & H. L. Ship Building Co. of Rockport, Me., will in the near future increase the capacity of their plant by the erection of another large building.

It is stated that the Toledo Dock & Warehouse Co. of Toledo, O., has purchased considerable property on the water front for the construction of docks.

The tug Fearless, building for the Spreckels Tugboat Co. of San Francisco by the Union Iron Works of that city, is nearly ready for launching.

The board of local improvements at Chicago has decided to straighten the Chicago river from Belmont avenue to Lawrence avenue at a cost of $45,000.

N. G. McAlexander, army quartermaster at Governor's island, New York harbor, is receiving bids for furnishing a steamboat for government service.

The Graselli Chemical Co. of Elizabethport, N. J., will have a steam lighter built to replace the E. Graselli, which was sold to the government.

Laighton Bros. of Portsmouth, N. H., have contracted for a 50-foot steam launch to replace the Pinafore, wrecked in the storm of Nov. 27.

NEEDS OF THE HYDROGRAPHIC OFFICE.

In his annual report, Commander J. E. Craig, hydrographer of the navy, says that the extraordinary demand for charts at the outbreak of hostilities with Spain taxed the chart-making facilities of the office to the utmost and resulted in an annual output of 142,436 reproductions of the 1,000 engravings that have now accumulated in the possession of the hydrographic office. Commander Craig says that the five branch offices on the great lakes, namely, Chicago, Cleveland, Buffalo, Duluth and Sault Sainte Marie are well placed, and give promise of covering their apportioned territory in the most satisfactory manner. Nearly all of the branch offices have been hampered by the detachment of the naval officers in charge for war service, but their work has been well carried on by those left to do it, though most of the offices had but one employee each, and in so far worked at a disadvantage.

A concluding paragraph in the report is as follows: "The work that lies before the hydrographic office to be done in order to put the government in possession of charts and sailing directions of its own production, so that there shall be no dependence on foreign publications for the use of the navy and of our merchant marine, is so great that increased facilities are needed to advance the work in the interests of the government. To attain this end increased appropriations can well be expended in providing a larger number of employees, more machinery, and a greater space consequently needed to carry on the work. The usefulness of the branch offices has been abundantly demonstrated. Their equipment in personnel, as well as in publications and instruments that are needed in the giving of information to shipmasters seeking aid from the offices, is at most of the offices inadequate, for the demands on them have greatly increased since their first establishment, and call for greater expenditures."

A contract for an ore handling plant, to embrace a Hulett patent car dumping machine of capacity to handle the largest steel hopper ore cars, has been placed with the Webster, Camp & Lane Machine Co. of Akron, by the Ohio Steel Co. of Youngstown. This machinery is to be used for handling ore at the furnace plant of the Youngstown company. The car dumper is to receive the cars as they come from the lake ports and dump each car into a series of four buckets, set side by side on a special car standing on a lower track. These special cars will be shifted by switching engines to any point along the side of the stock pile at which it is desired to stock the ore. The stock pile ground is to be commanded by a complete system of tramways, on which the power will be electrical.

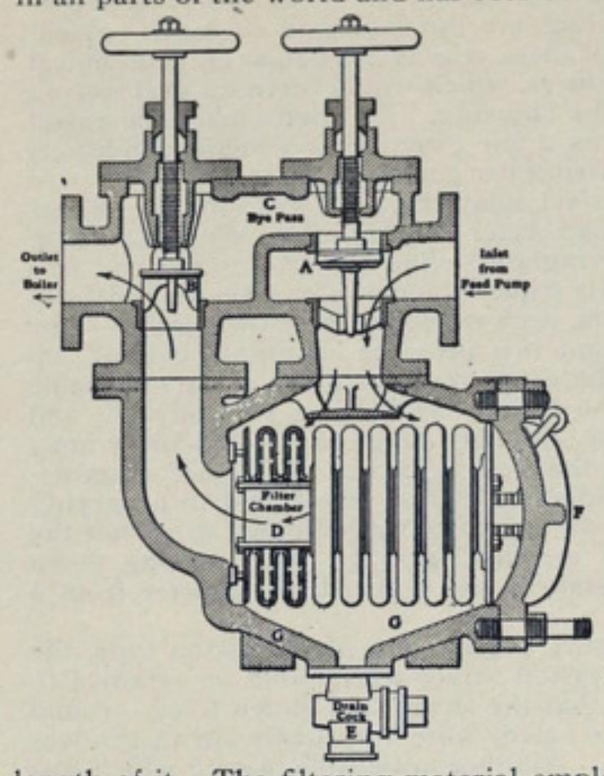
In the release of the steamer Tampa from Beaver Bay, Capt. W. H. Singer of Duluth has given confidence to the shipping interests, and especially the underwriters, in the matter of future wrecking operations on Lake Superior. The Singer tug business has always been well conducted, and this job on the Tampa, which was one of the best of the past season, in view of limited wrecking appliances, gives assurance of the right kind of effort being made to release vessels that may meet with serious accident at the head of the lakes. It should lead to the establishment of a successful wrecking business by Capt. Singer.

Detroit lodge of the Ship Masters' Association has elected the following officers: President, Capt. A. J. McKay, (his re-election for the fourth consecutive time); first vice president, Capt. William Roach; second vice president, Capt. James Watts; secretary, C. L. Wilson; treasurer, Capt. Hiram Still. Capt. James Waltman was re-elected trustee for the three year term. Capt. James Beaufait was appointed marshal, Capt. James Parsons, chaplain, and Capt. George Burns, sentinel.

It is announced from Washington that Commodore Philip has been appointed to succeed Rear Admiral Bunce in command of the Brooklyn navy yard, the appointment to take effect Jan. 15.

FILTER FOR USE ON STEAMERS.

The Review presents herewith an illustration of a type of feed water filter or oil separator which has been extensively employed on steamers in all parts of the world and has received an endorsement which for unanimity is really remarkable. Its function is to remove oil from feed water, where the water is used over and over and has already passed through the engine and carries more or less of the lubricating oil, which it is very necessary to exclude from the boilers. The filter is connected into and forms a part of the feed pipe, being located between the feed pump and the boiler.



Referring to the illustration, the operation of the filter will be readily understood. The valves of the filter are shown in position for the regular operation of filtering. The water enters the right-hand pipe at the top and passes down into the large chamber below. The central portion of this chamber is occupied by the filter, which extends horizontally the entire length of it. The filtering material employed is what is familiarly known as Turkish toweling, although it is manufactured in the United States. The skeleton of the filter consists of light circular bronze sections of open lattice work, held together by long bolts, extending through the whole. The toweling, which is in the shape of a bag and much larger than the skeleton, is drawn over it and drawn down between each of the sections by means of strings wound around it. The filtering surface thus provided is very large, being from 250 to 1,000 times the area of the feed pipe, according to the service required. The water then passes slowly through the filtering material into the interior of the skeleton and out at the left-hand end, and thence to the boiler, as indicated by the arrows.

The oil or other matter separated from the water accumulates on the outer side of the filtering material, and in time begins to offer appreciable resistance to the free flow of the water. This resistance will be indicated by the difference in the reading of two pressure gauges and when this difference reaches two or three pounds the filter may be cleaned by reverse washing in position or by changing the filter, a spare one always being provided. It will be noticed that valve A has a face on both its upper and its lower corner, and that it seats upon both the upper and lower bushings. If the valve is screwed down the feed water passes to the boiler without passing through the filter. If valve B is then closed and the drain cock at the bottom opened, the head F may be taken off, the clogged filter removed and the clean filter inserted, the entire operation usually not taking more than five minutes.

For washing the filter without removal valve A is first closed, or screwed down, and then B is closed and the drain cock is opened. Valve A is then opened a little and the current thus created around the filter washes the outside of it. By shutting the valve A and opening B the current is made to wash the interior of the filter or to wash through it from the inside. The filter is made amply strong for the highest pressures employed in modern practice, being tested at 500 pounds. It is built by the Ross Valve Co., Troy, N. Y.

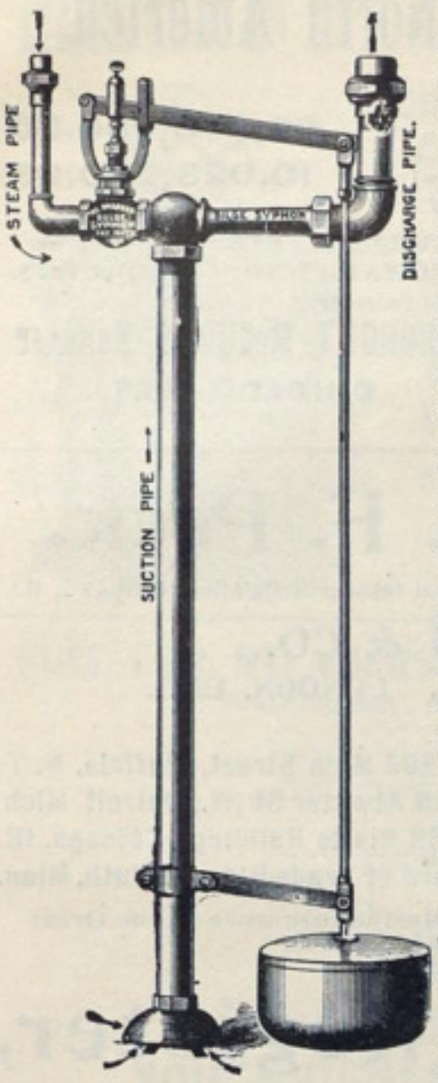
CANADIAN SURVEYS.

It is announced from Ottawa that the hydrographic survey of the Canadian marine department has again been carried on very energetically during the past season, especially in the stretch of dangerous waters below the Sault river, from False Detour channel to the vicinity of the entrance to Georgian bay. An inspection was also made of the approach to Depot harbor, Parry Sound, to ascertain whether it was suited to the requirements of the deep draught vessels which now trade there regularly. This season is the first in which the Canadian department has carried on hydrographic work on Lake Huron, and it is stated that in all probability there will be issued previous to the opening of navigation in 1900, the first sheet chart embracing all the shore line and water from the mouth of St. Mary's river to the Ducks. A second chart of the south shore of Grand Manitoulin island will be issued later. The survey of the Canadian shore of Lake Erie, which was completed in 1897, has been partially published by the British admiralty, which has just issued two coast charts of the Canadian shore from Buffalo to Port Burwell, including Long point and Port Dover. A new edition of the sailing directions for Georgian bay is being prepared by the hydrographic staff and will be issued in a short time.

A report has been filed with the navy department relative to the cruise of the gunboat Charleston from Honolulu. The report divides the trip into two sections, one from Hawaii to Guam and the other from Guam to Manilla with these recorded results, respectively: Coal consumed, 544 tons and 299 tons; days steaming, 15 and 8; average speed, 9 knots and 8.9 knots; knots per day, 220 and 216; knots per ton, 6.09 and 5.8; tons per day, 36.3 and 37.3; distance steamed, 3,314 knots and 1,734 knots. The total distance steamed was 5,048 knots, the steaming radius of the Charleston being 5,166 knots.

It is now stated that the United Steamship Co. of Copenhagen, which inaugurated its service between Russian Baltic ports and the United States with the sailing of the Georgios from Riga for Boston and New York on Nov. 8, intends to build three vessels on the other side of the Atlantic, and that they hope to find capital for three others in the United States.

THE BRAENDER BILGE SYPHON.



All sea-faring, lake, river and coast steamboat men appreciate the benefits afforded by a dry ship bottom. The safety to life and health that such a condition insures, as well as the protection to cargoes carried, means much in ease of mind to those in charge, and satisfactory results generally. A dry bottom in a ship's hold means speed also.

An admirable device for effecting this desirable condition and one which we heartily commend to the attention of our readers is the Braender automatic bilge syphon, manufactured by Philip Braender, No. 47 W. 125th St., New York. When once this pump is set in place, it needs no further attention, as it works automatically and starts pumping upon the least accumulation of water in the hold. It is simple in construction and operation and its entire freedom from possible disarrangement, together with its pronounced success in removing large quantities of water at a nominal cost of operation, has won it the approval of leading engineers, ship owners and seamen everywhere.

The United States government endorses the Braender bilge syphon and it is used and recommended by the Starin and other companies. In one instance it was found that a boat after being equipped with this device could be loaded with several tons more freight than formerly. Mr. Braender will be pleased to furnish catalogues and any further information upon application.

Gen. T. W. Hyde of the Bath Iron Works, Bath, Me., is enjoying much better health at present than at any time for a year past, and he displayed all his old time energy during a recent trip to Washington, where he did yeoman service in the presentation of arguments in favor of the Hanna shipping bill.

A rumor is in circulation to the effect that the White Star line will build two more steamers of even greater dimensions than the new Oceanic, after the launch of that vessel on Jan. 14.

The new Boston dry dock, for which the navy department will soon call for bids, will be 700 by 300 feet in surface dimensions. The appropriation is $1,025,000.

TRADE NOTES.

The Niles Tool Works Co. of Hamilton, O., is erecting a 200 by 70 foot addition to its plant. The new building will be ready for occupancy about Jan. 15.

Manning, Maxwell & Moore, who lately bought the Chicago branch of the J. A. Fay & Egan Co., have secured the exclusive northwestern agency of twenty prominent tool building concerns.

A 19-ton hoisting engine for the Merritt & Chapman Wrecking Co. is building at the J. S. Mundy works, Newark, N. J. Two complete 60-foot pile drivers have lately been shipped by this firm to the Brooklyn navy yard.

Four views of the steamer Arthur Orr as she appeared when stranded on the north shore of Lake Superior were printed recently as a supplement to the Review. We have had several inquiries regarding the excellent photographs from which the engraving was made. They were taken by C. L. Higgins of 418 West Eighth avenue, Duluth.

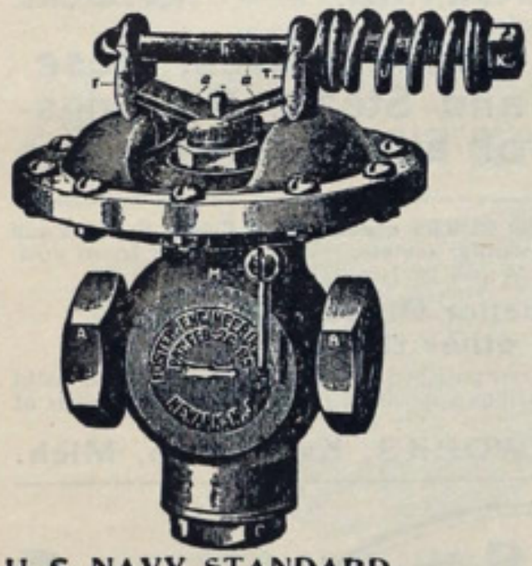
Steel work of a building 50 feet wide and 80 feet long—a house for generator, boilers and engine—which is being erected by the United Gas & Improvement Co. of Gloversville, N. Y., will be furnished by the Berlin Iron Bridge Co., of East Berlin, Conn. The side walls are of brick and the roof framing of steel, which will suport slate roof covering. The trusses are clear span—no interior columns—and rest directly on the side walls of brick.

The International Navigation Co. has just placed an order with the Marine Vapor Engine Co. of Jersey City, N. J., for two specially built 30-foot launches equipped with 12 horse power also vapor motors, to be used as tenders for the steamer New York, (formerly U. S. S. Harvard) on her winter cruise to the battlefields of Cuba and Porto Rico. They are to be ready for delivery Feb. 22, 1899, and to be thoroughly adapted for towing long boats used in landing passengers on the coast, where there are no piers or wharves.

The swell thing of the season in the way of a Christmas advertising specialty comes from H. A. Foss, board of trade weighmaster at Chicago. It is a pocket diary, gilt edged and enclosed in a leather case of the finest quality. Nothing better in the stationer's line—save gold or silver trimmings—can be found anywhere in the country, and best of all, the only mark of advertising is a note of compliments on a hidden leaflet, written by Mr. Foss. The ship master or vessel owner who is favored with one of these diaries is fortunate.

Harland & Wolff of Belfast, Ireland, are considering the question of charging an admission fee of one shilling to their ship yard on the occasion of the launch of the big White Star liner Oceanic, the proceeds to go to the fund of a worthy hospital.

With their peerless trio of fast express trains daily, low rates, unexcelled dining car service and magnificent vestibuled sleeping cars through to New York City and Boston, the Nickel Plate road offers the traveller to those points every comfort and convenience demanded by the exacting American public. 278, Dec. 31



THE FOSTER
"New Class W"
Pressure Regulator.

The Experimental Board of the Bureau of Steam Engineering of the U. S. Navy, after recent tests, report that it is:

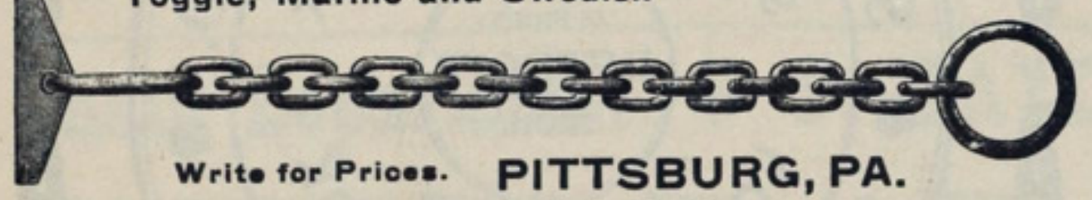
"THE BEST PRESSURE REGULATOR AND REDUCING VALVE WITHIN THEIR KNOWLEDGE."

Foster Engineering Co.,
NEWARK, N. J.

U. S. NAVY STANDARD.

JAMES McKAY & CO.

Manufacturers of all kinds of
High Grade Boom, Rafting, Toggle, Marine and Swedish **IRON CHAINS.**



Write for Prices. PITTSBURG, PA.

PROPOSALS FOR STEEL HULLED STEAM TENDERS. U. S. Engineer Office, Custom House, St. Louis, Mo., December 14, 1898. Sealed proposals for construction of three steel hulled steam tenders will be received here until 12 M., January 14, 1899, and then publicly opened. Information furnished on application. Thos. H. Handbury, Major, Eng'rs. Jan. 5

U. S. ENGINEER OFFICE, Duluth, Minn., Dec. 10, 1898. Sealed proposals for furnishing 12,000 barrels of Portland cement for the concrete superstructure for piers for Duluth ship canal will be received here until noon, Jan. 10, 1899, and then publicly opened. Information furnished on application. Clinton B. Sears, Major, Engrs. Jan. 5

SEALED proposals will be received at the office of the Light-House Engineer, Milwaukee, Wis., until 12 o'clock M., January 20th, 1899, and then opened, for furnishing the boilers and machinery for six complete steam fog signals, in sets of two, delivered at the Light-House Depot, St. Joseph, Mich., in accordance with specifications, copies of which with blank proposals and other information may be had upon application to J. G. Warren, Captain, Corps of Engineers, U. S. A. Jan. 5.

Marine Boilers For Sale.

Two fire-box boilers, 8½ by 16 feet; in good condition; allowed 100 pounds steam. For further particulars address E. G. CROSBY & CO., Muskegon, Mich. Jan. 12

THE BOURNE-FULLER CO.

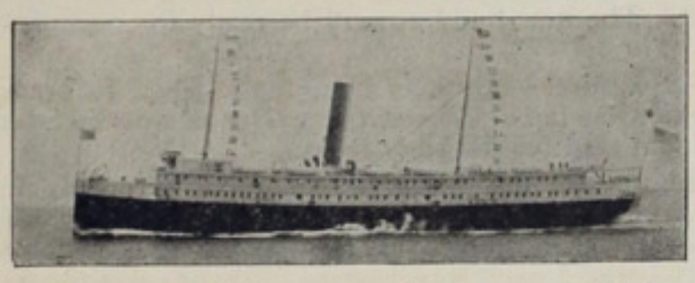
CLEVELAND, O.

BAR IRON. PIG IRON.

ARCHES AND STRAPS FOR WOODEN VESSELS.

BOILER RIVETS. BOILER TUBES. BRACE IRON.
IRON AND STEEL SHEETS. MACHINERY AND TOOL STEEL.
BESSEMER AND OPEN HEARTH STEEL.
SHIP PLATES, BOILER PLATES, SHIP RIVETS.
BEAMS, CHANNELS, ANGLES, BARS, AND OTHER SHAPES.
BILLETS, BLOOMS AND FORGINGS.
"BYERS" FULL WEIGHT WROUGHT IRON PIPE.

ROACH'S SHIP YARD.



DELAWARE RIVER
IRON
SHIP-BUILDING & ENGINE WORKS,
CHESTER, PA.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

New York Office, Morgan Iron Works, Foot East Ninth St

Newport News Shipbuilding & Dry Dock COMPANY.

WORKS AT NEWPORT NEWS, VA.
(On Hampton Roads.)

Equipped with a Simpson's Basin Dry Dock capable of docking a vessel 600 feet long drawing 25 feet of water, at any stage of the tide. Repairs made promptly and at reasonable rates.

SHIP AND ENGINE BUILDERS.

For estimates and further particulars, address

C. B. ORCUTT, Pres't,
No. 1 Broadway. New York.

The Pusey & Jones Company,

WILMINGTON, DELAWARE.

Builders of **IRON AND STEEL STEAMERS, STEAM YACHTS, TOW BOATS, MARINE ENGINES, BOILERS, TANKS, AND OF HEAVY MACHINERY GENERALLY.**

ALSO COPPERSMITH WORK.

SPECIAL FACILITIES for REPAIRS to both WOODEN and METAL BOATS.

MARINE RAILWAY. NO WHARFAGE CHARGED.

Ship's Cables
Dredge Chains
Steam Shovel Chains
Crane Chains
Block Chains

LEBANON CHAIN WORKS,

LEBANON, PA.

MANUFACTURERS OF

HAND-MADE AND MACHINE-MADE **CHAINS**

OF ALL GRADES.

WE MANUFACTURE OUR OWN IRON.

All our Chains are tested. High Grade Chains a Specialty.

THE CRUMLISH FORGE For Rivet Heating.

USED BY THE LEADING

Ship Builders, Bridge Building and Structural Concerns.

CRUMLISH FORGE CO.

Send for Circular. BUFFALO, N. Y.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - $3,000,000.00
ASSETS, . - - - - - - - 10,023,220.93

CHARLES PLATT, President. GREVILLE E. FRYER, Sec'y. & Treas'
EUGENE L. ELLISON, Vice-President. T. HOWARD WRIGHT, Marine Sec'y.
JOHN H. ATWOOD, Assistant Secretary.

Lake Marine Department.

GEORGE L. McCURDY, Manager
CHICAGO, ILLS.

Chas. E. & W. F. Peck,

58 William St., NEW YORK CITY. Royal Insurance Building, CHICAGO, ILL.

C. T. BOWRING & CO.,
5 and 6 Billiter Avenue, E. C., LONDON, ENG.

INSURANCE

BROWN & CO., . . 202 Main Street, Buffalo, N. Y.
PARKER & MILLEN, 15 Atwater St., W., Detroit, Mich.
J. G. KEITH & CO., 138 Rialto Building, Chicago, Ill.
LA SALLE & CO., Board of Trade Bldg., Duluth, Minn.

Are prepared to make rates on all classes of Marine Insurance on the Great Lakes, both CARGOES and HULLS.

Great Lakes Register,

Combined and issued in connection with BUREAU VERITAS International Register of Shipping.

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.

THE MANHATTAN RUBBER M'F'G CO.

No. 212 Champlain Street,
CLEVELAND, OHIO.

W. D. ALLEN, AGENT,
151 LAKE STREET, CHICAGO, ILL.

Marine Valves, Hose and Steam Packings of all kinds.

BUILDERS OF LAUNCHES

AND OTHERS needing Cast Brass, Bronzes and similar metals. Want to hear from you. Want to furnish you with

Boat Trimmings, Propeller Blades, Wheels, Engine Bearings, and other things.

Can furnish the rough castings or completed parts, polished or nickel plated. Clean solid castings, A No. 1 quality. Phosphor bronze bearings a specialty. Send sample, patterns or drawings.

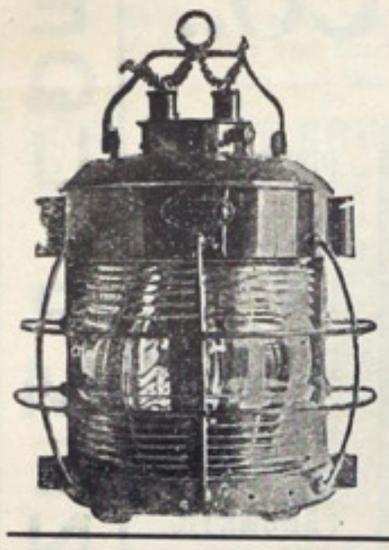
STANDARD BRASS WORKS, Kalamazoo, Mich.

PATENTS

A special opportunity to reduce cost of fees involved in securing a patent of any kind.

A. DISCOUNT,
409 Perry-Payne Building, Cleveland, O.

MARINE LAMPS



Oil and Electric Equipment for Steamships, Yachts, etc.

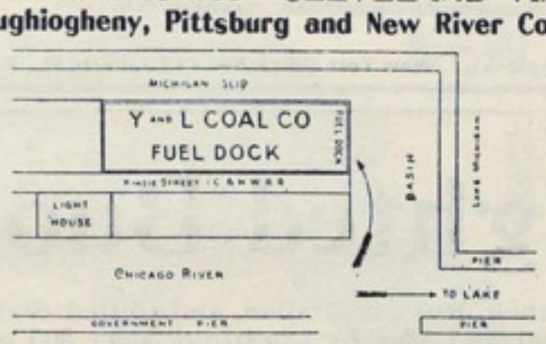
Signal Lights, Saloon Fixtures, Cabin Lamps, Lanterns, etc.

Wm. Porter's Sons,

271 Pearl St., NEW YORK CITY.

FUEL FOR STEAMERS AT CLEVELAND AND CHICAGO

Youghiogheny, Pittsburg and New River Coal.



VIEW OF DOCK NO. 1, CHICAGO HARBOR.

YOUGHIOGHENY & LEHIGH COAL CO.

JOHN T. CONNERY, Mgr. ARCHIE J. HITCHCOCK, Dock Supt.

FUEL DOCKS—No. 1, Michigan Slip and Basin; Phone ——.
No. 2, North Halstead St. Bridge. Phone 773 North.

LIGHTER—Equipped with 125 two ton buckets for fueling anywhere in harbor of . . . . . **CHICAGO.**

Main Office, 1238-1242 Chicago Stock Exchange Building,

110 La Salle Street, Chicago, Ill. Long Distance Telephone, Main 5049.

THE PITTSBURGH & CHICAGO GAS COAL CO.

J. A. DONALDSON, Mgr. N. J. BOYLAN, Dock Mgr.

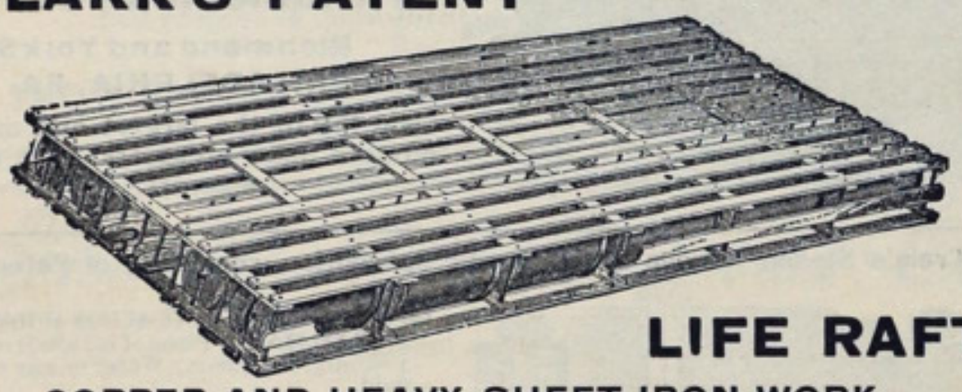
FUEL DOCKS—Latest Dock and Lighter equipment for rapid fueling. River Bed, through Valley Railway Bridge and Foot of West River St., **CLEVELAND.**

LIGHTER—With 150 2½ ton buckets (400 tons capacity.)

TELEPHONES: { Main Office—Main 1888. Fuel Dock Office—West 190.

420-421 PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

CLARK'S PATENT



LIFE RAFT.

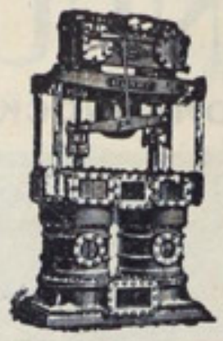
COPPER AND HEAVY SHEET IRON WORK,
McCOY LUBRICATORS, BRASS MARINE WORK.
STEAM FITTING, ENGINEERS' SUPPLIES.

DETROIT

SHEET METAL AND BRASS WORKS.

FOOT OF ORLEANS STREET. OPEN DAY AND NIGHT.

THE GEO. F. BLAKE MFG. CO.



BUILDERS OF

MARINE PUMPS

Single and Duplex Pumps for Boiler Feed, Fire or Bilge Service—Vertical and Horizontal.

Vertical and Horizontal Pumps, Air Pumps for Surface and Jet Condensers.

AIR PUMP ON J. G. BRUISER NEW YORK.

95 and 97 Liberty St., NEW YORK.

The Roberts Boiler Co.

Have built about **1000 BOILERS TO DATE** for

Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-Wheelers, Canalers; also for Navy Department, War Department, Treasury Department, Light-House Board and Revenue Cutter Service; also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

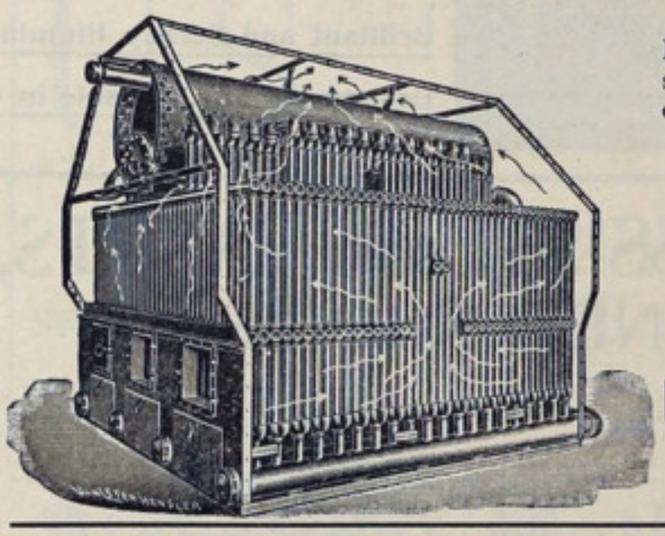
Never killed a man or had a serious accident. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every Boiler Warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,

39 and 41 Cortlandt Street, New York City.

Works, Red Bank, N. J.

THE "TAYLOR" YACHT BOILER



Has held the record three seasons on the fastest yacht on the great lakes.

Guaranteed against Rupture of Tubes.

Will not Prime in the Roughest Sea.

MANUFACTURED BY

Detroit Screw Works,

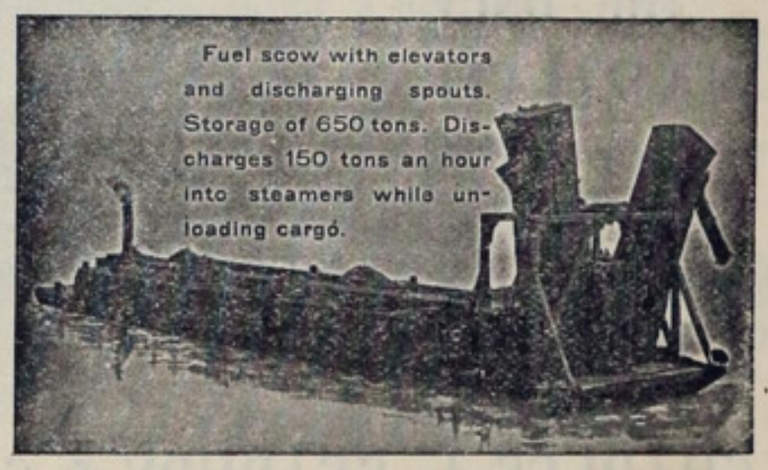
FOOT OF REOPELLE ST.,
DETROIT, MICH., U. S. A.

Steamboat Fuel at Ashtabula.

LARGE SUPPLIES OF BEST QUALITY.

Lighter

Carrying Different Grades at all Times.

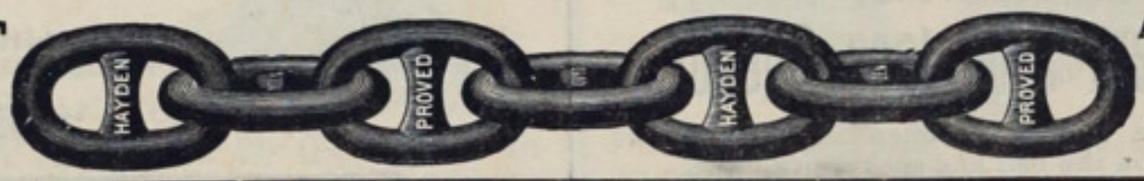

Fuel scow with elevators and discharging spouts. Storage of 650 tons. Discharges 150 tons an hour into steamers while unloading cargo.

M. A. HANNA & CO., **Miners and Shippers.** Main Office, Perry-Payne Bldg., Cleveland

---

Chain Department ✻ P. HAYDEN S. H. CO. ✻ Columbus, Ohio.

Our Chain in use on the Largest Steamers on the Lakes:
The Zenith City, Victory, North West and North Land, and many others.



All kinds of Chain—Stud and Close Link, Cable Chains.

Write for Prices

H. A. BARR, PRESIDENT, Escanaba. F. H. VAN CLEVE, SEC. Escanaba. CAPT. GEO. BARTLEY, SUPT. Escanaba.

ESCANABA TOWING & WRECKING CO., Escanaba, Mich.

Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready

TUG MONARCH, { Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch. Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, TUG OWEN, { Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds. Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

THOS. DREIN & SON,

TATNALL AND RAILROAD STS., WILMINGTON, DEL.

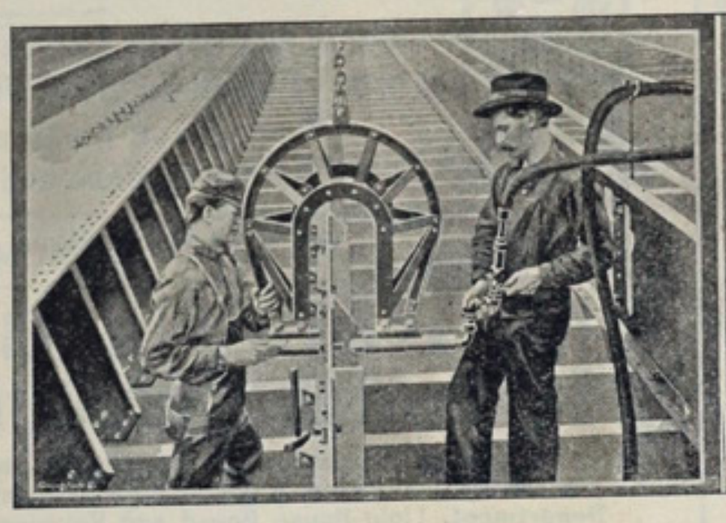
Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats, Life Preservers. Outfit for Lake Steamers a Specialty.

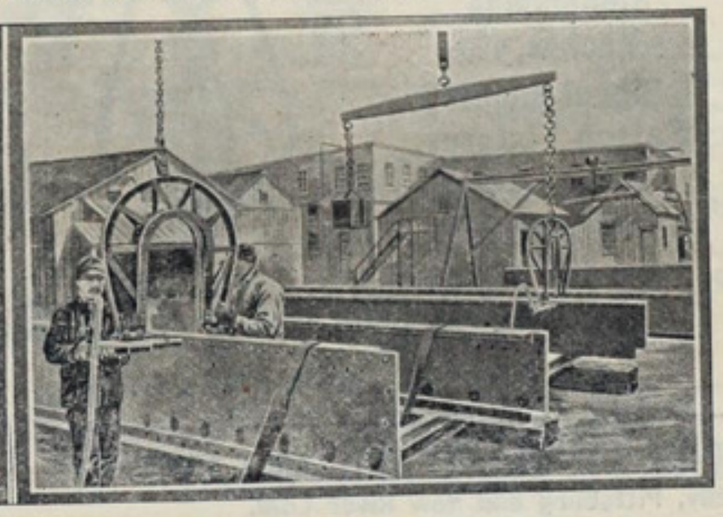
SHIP YARD

CHICAGO PNEUMATIC TOOL CO.,

635 MONADNOCK BLOCK CHICAGO ILL.

PNEUMATIC HAMMERS FOR CAULKING AND CHIPPING.



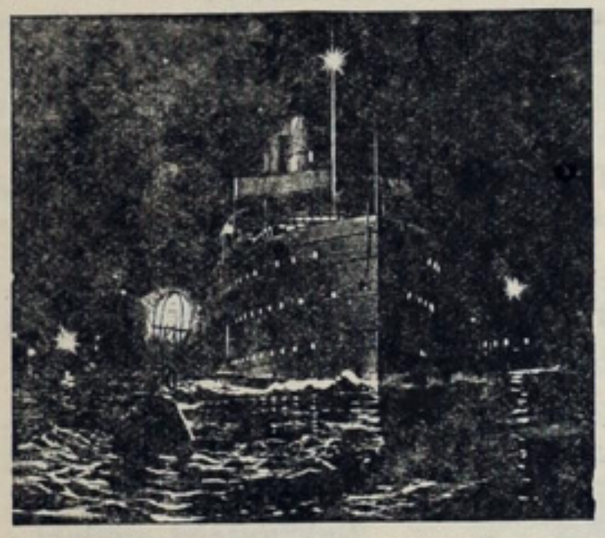


PISTON AIR DRILLS FOR DRILLING and REAMING.

PNEUMATIC RIVETERS.

MACHI ES GUARANTEED ONE YEAR AGAINST REPAIRS, and TOOLS SENT ON TEN DAYS' TRIAL Subject to Approval. New York Office No. 112 Liberty St., Beard Bldg.

EQUIPMENT



Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for Channel and Harbor Lighting; over 800 gas buoys and gas beacons in service.

Burn Continuously from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

Brilliant and Steady Illumination.

Economical and Reliable in Operation.

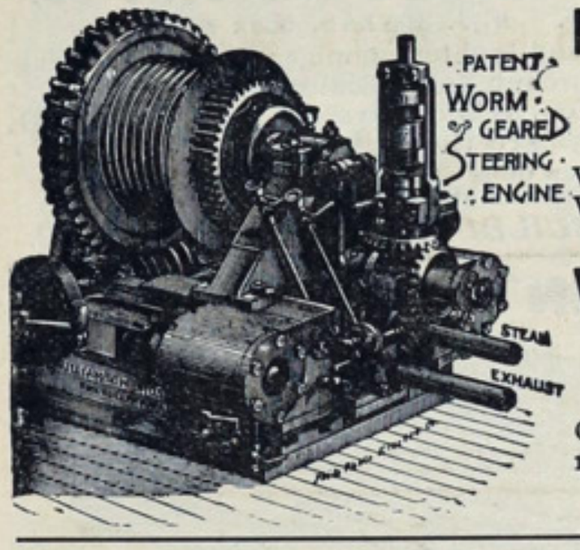
Controlled by the SAFETY CAR HEATING AND LIGHTING CO.,
160 Broadway, New York City.

HIGH CLASS STEAM YACHTS,
MARINE ENGINES,

Seabury's Water Tube Boilers,
AND
THE ONLY
NAPHTHA LAUNCH,
GAS ENGINE & POWER CO.
AND

CHARLES L. SEABURY & CO.,
Consolidated,
MORRIS HEIGHTS, NEW YORK CITY.

Send 10c. stamp for catalogue.



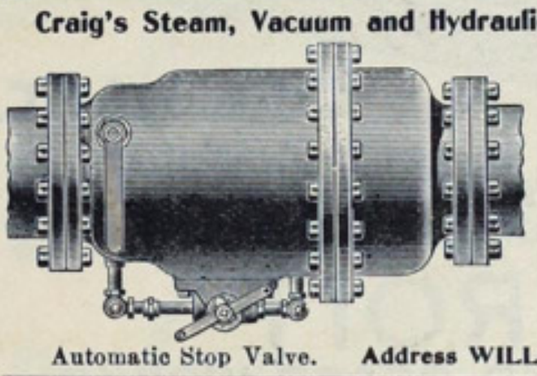
Hoisting and Steering ENGINES.

With either Frictional, Spur or Worm Gear of various patterns to suit all purposes.

Williamson Bros.
Richmond and York Sts.
PHILADELPHIA, PA.

Over 150 of the largest and most modern lake steamers have our steerers.

Craig's Steam, Vacuum and Hydraulic Specialties, consisting of Patent



Automatic Stop Valve.

IMPROVED SAFETY QUICK-ACTION AUTOMATIC STOP VALVES, for Pipes of all kinds under Pressure, for Steam, Water or any other fluid.

IMPROVED AUTOMATIC EXHAUST RELIEF VALVES, for Condensing and Non condensing Engines, Marine or Stationary.

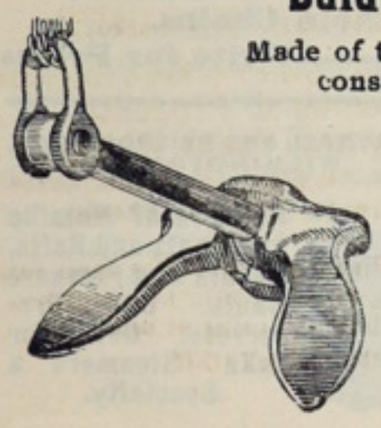
IMPROVED AUTOMATIC JET CONDENSING APPARATUS, for all kinds of Steam Engines.

IMPROVED HEATING AND CIRCULATING APPARATUS for Marine Boilers.

Address WILLIAM CRAIG, 42 Cortlandt St., New York.

Fred'k Baldt, President W. M. Gelston, Vice President
W. S. Bickley, Sec'y and Treas,

Baldt Patent Stockless Anchor.



Made of the finest quality of open-hearth steel and constructed on the ball and socket principle.

Many points of superiority over ordinary Stockless Anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.
WALTER MILLER, Western Reserve Bldg.
Cleveland, Ohio,

Representative for the Great Lakes.

New catalogue containing valuable tables sent on application.

THE LATEST! THE BEST!

"RUBBERBESTOS"

A Perfect Combination of Asbestos and Rubber.

A Combination Approved by all Practical Engineers, and is a NEW DISCOVERY in the MANUFACTURING of SHEET PACKING.

THE HIGH PRESSURE PACKING

"METALBESTOS"

Patented April 2, 1895.

The Most Successful Marine Steam Packing Made!

Made of ASBESTOS and covered with a SOFT METALLIC WIRE.
It Cannot Burn, Char or Blow Out. Try It! It Will Save You Lots of Trouble!
SEND FOR SAMPLES.

A. W. CHESTERTON & CO., 49 India St., BOSTON, MASS

If you use Square Flax send to us for a sample of our new brand. The "Devereaux Special." It will interest you.

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

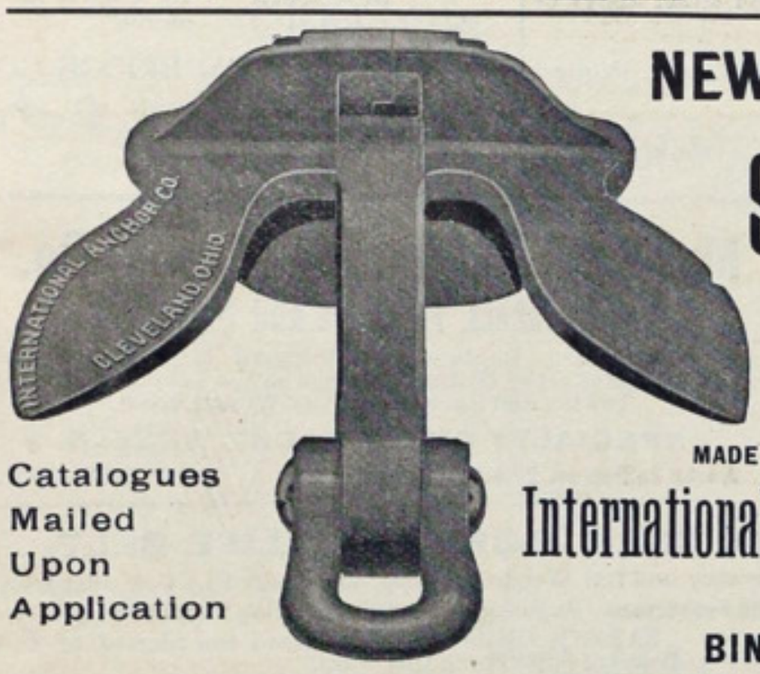
JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DELTA METAL

REG TRADE MARKS "Phosphor Bronze" DELTA

THE PHOSPHOR BRONZE SMELTING CO. LIMITED, 2200 WASHINGTON AVE., PHILADELPHIA. "ELEPHANT BRAND PHOSPHOR-BRONZE" INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC. —DELTA METAL— CASTINGS. STAMPINGS AND FORGINGS. ORIGINAL AND SOLE MAKERS IN THE U. S.

PROPELLERS



NEW PATENT

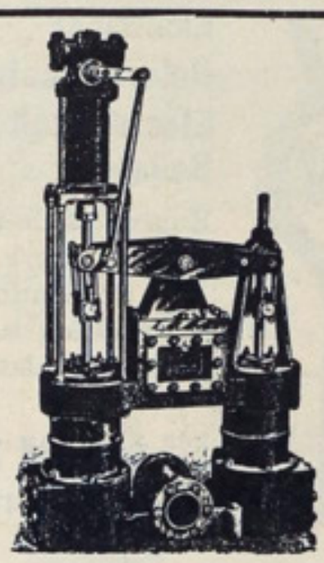
STOCKLESS ANCHOR

Catalogues Mailed Upon Application

MADE BY THE

International Anchor Co.

CLEVELAND, O.
BINGHAMTON, N. Y.



M. T. DAVIDSON,

VERTICAL OR HORIZONTAL

MARINE | AIR CIRCULATING BOILER FEED BILGE | PUMPS

Single or Duplex. Combined or Independent.

Surface Condensers. Ash Ejectors.

43-53 Keap Street, BROOKLYN.

Branches: 133 Liberty Street, NEW YORK. 30 Oliver Street, BOSTON.

HOWARD H. BAKER & CO.

Ship Chandlers and Sail Makers,

18 to 26 Terrace, BUFFALO, N. Y.

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & S." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

U.S. METALLIC PACKING CO.,

427 North 13th St.,
PHILADELPHIA, PA.

Rod Packing for all kinds of steam service. Prices from $5.00 per inch up. Write for catalogue.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

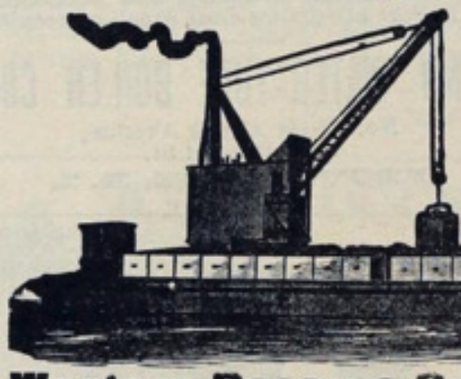
HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, Ohio.

Pickands, Mather & Co.,



FUEL LIGHTERS AT BUFFALO, ERIE, ASHTABULA AND CLEVELAND.

At DETOUR, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.

Best Quality PITTSBURGH COAL furnished at any time during Day or Night.

Western Reserve Building, CLEVELAND, O.

OUR NEW CATALOGUE

OF

Yacht, Boat and Canoe Hardware and Supplies,

NOW READY.

Have you sent for one? They will be forwarded in the order in which the requests are received.

Send 10 cents in stamps.

L. W. Ferdinand & Co.,

184 Federal St., BOSTON, MASS.

H. G. TROUT, KING IRON WORKS,

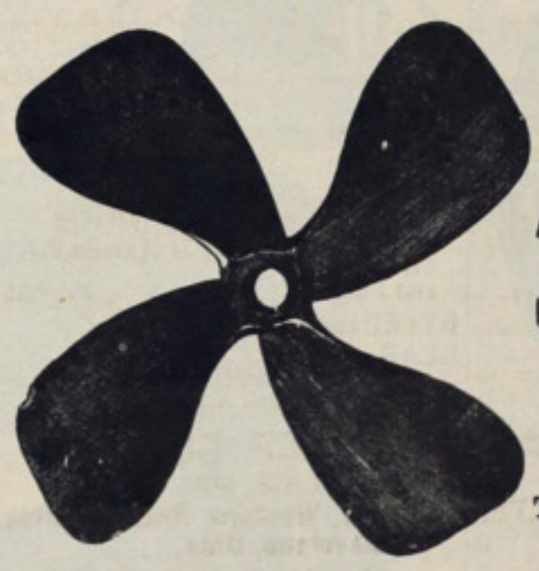
BUFFALO, N. Y.

MANUFACTURERS OF

TRIPLE EXPANSION, THREE CYLINDER, FORE AND AFT And STEEPLE COMPOUND MARINE ENGINES,

High and Low Pressure Engines, Sectional. Propeller, Tug and Yacht Wheels.

Cowles Aluminum and Manganese Bronze Propeller Wheels.



These Wheels are noted for their extra speed, towing power and proportionate saving of coal.

PRICES QUOTED ON APPLICATION.

A. J. MORSE & SON.

DIVING APPARATUS

140 CONGRESS ST. BOSTON.

Chicago Nautical School,

20 MICHIGAN AVE., CHICAGO.

A Full and Complete Course of Instruction in Lake and Ocean Navigation. Candidates prepared for Examinations before Local Inspectors.

GREAT LAKES REGISTER PRIZES.
Two Prizes, $50; Six $25.

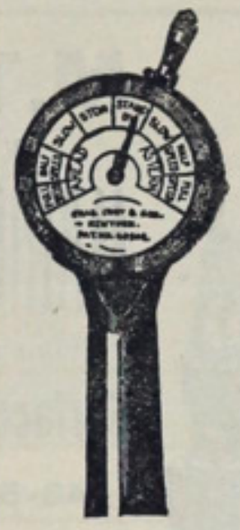
Students may begin at any time.

SEND FOR CIRCULAR.

Chas. Corv & Son

Manufacturers of the

Mechanical and Electric Marine Telegraph,



Electrical Helm Indicators

Electric Call Bells.

Engine Bells and Brass Work of all descriptions, Shrieking and Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

ALFRED B. SANDS & SON,

MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties.

Marine Water Closet for either above or below water line.
Folding Lavatories, Ventilators, Pumps, Tanks, &c., &c.

134 BEEKMAN ST, NEW YORK.

BRIDGE BUILDING

OUR CATALOGUE

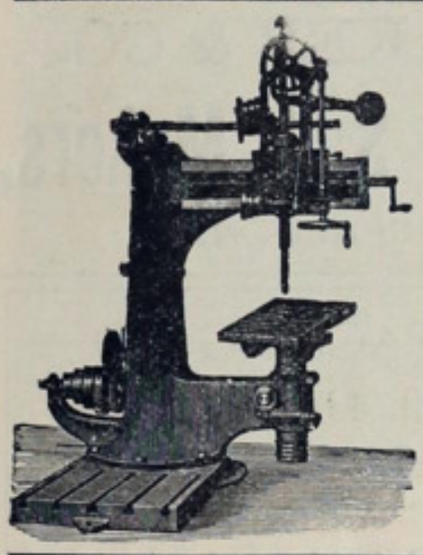
OF THREE HUNDRED PAGES ILLUSTRATING AND DESCRIBING A LARGE NUMBER OF

BRIDGES
BUILDINGS
AND ROOFS

Designed and Built by us

Is now ready and will be sent on application.

THE BERLIN IRON BRIDGE CO.
EAST BERLIN, CONN.



Bement, Miles & Company

PHILADELPHIA, PA.

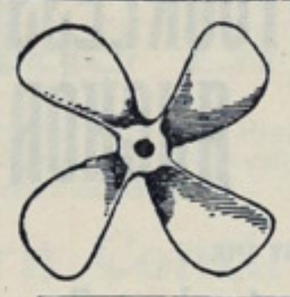
MANUFACTURERS OF

Metal Working Machine Tools

For Ship Yards, Railroad Shops, Locomotive nnd Car Builders, Machine Shops, Rolling Mills, Steam Forges, Boiler Shops, Bridge Works, etc.

Steam Hammers, Steam and Hydraulic Riveting Machines.

New York Office: Taylor Bldg No, 39 Cortlandt St.
Chicago Office: 1534 Marquette Building.



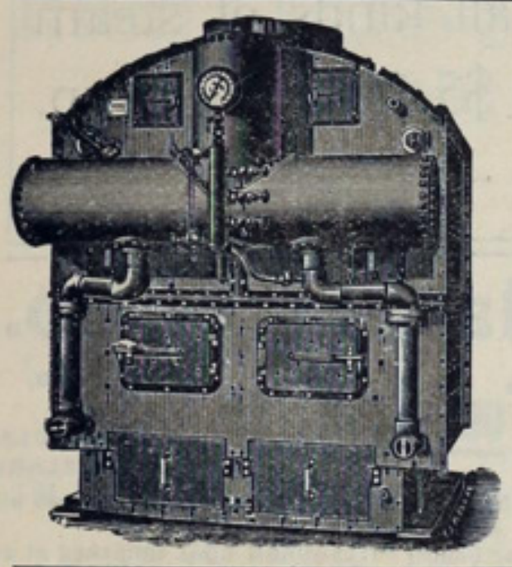
MacKinnon Manufacturing Co.

Boiler Makers, Founders and Machinists.

Marine Boilers, Engines and Shipyard Machinery Most powerful set of Hydraulic Slings on the Lakes. Best Towing and Speed Propeller Wheels made.

SPECIALTY SMALL YACHT WHEELS.

Works and office. 224-230 N. Water St.. BAY CITY, MICH.



ALMY'S PATENT

SECTIONAL

Water-Tube Boilers.

NOW USED IN
16 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boilers are giving most excellent results.

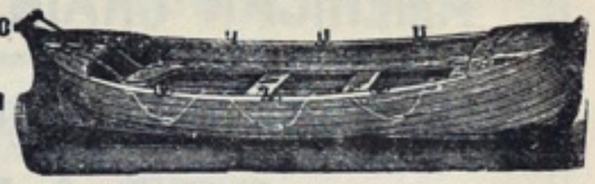
ALMY WATER-TUBE BOILER CO.,
No. 178-184 Allens Avenue, near Rhodes St.
PROVIDENCE, R. I.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors
Consolidated Cork Life Preservers. Superior to all others. **Ring Buoys and Fenders.**

SAFEST, CHEAPEST. Approved and adopted by U. S. Board of Supervising Inspectors.
Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Vessels and the trade supplied. Send for catalogue.
Awarded four Medals by World's Columbian Exposition

Metallic and Wooden Life Boats.



Metallic Life Rafts, Marine Drags.
Manufacturer of Woolsey's Patent Life Buoy, which is the lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.
Get our prices before buying elsewhere.

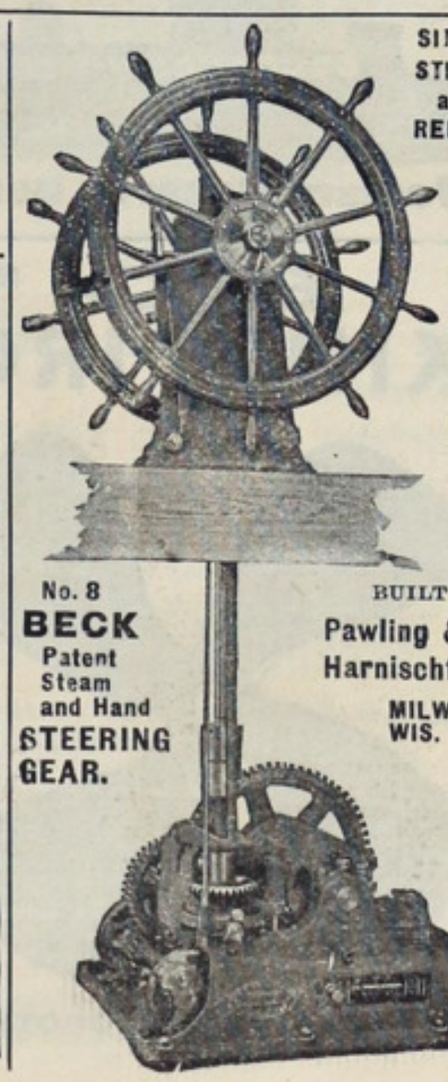
D. KAHNWEILER,
437 Pearl Street, NEW YORK CITY.

Scott's Coast Pilot, FOR

Great Lakes and Connecting Waters,

AT $1.50.

For sale by the MARINE REVIEW.



SIMPLE, STRONG and RELIABLE.

Changed from Steam to Hand by one Lever in Less Than One Second

No. 8 **BECK** Patent Steam and Hand **STEERING GEAR.**

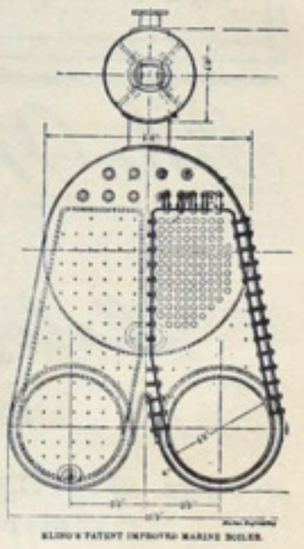
BUILT BY
Pawling & Harnischfeger,
MILWAUKEE WIS.

The Kling Marine Boiler.

LIGHT WEIGHT.
RAPID STEAMING.
PERFECT CIRCULATION.
BURNS ANY FUEL.

Will give greater economy and larger steaming radius over older types of boiler.

Vessel owners cannot afford to overlook one of the prime factors of cost in transportation—the fuel bill. Fuel bills with our boilers are only two-thirds the bills of ordinary boilers.



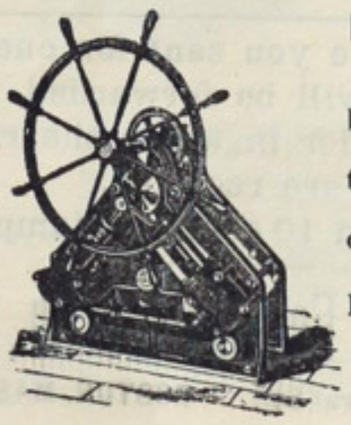
KLING BROS., Boiler Makers, 287 Hawthorne Ave., CHICAGO, ILL.

SELLERS' RESTARTING INJECTOR

LONG LIFTS — HOT WATER — SIMPLEST AND BEST — WIDE RANGE — LONG SERVICE

For Stationary, Portable, Traction Engines, Tugboats, &c.
Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.

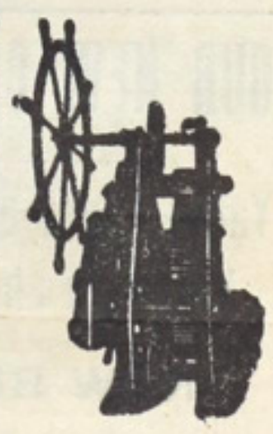
SHERIFFS STEAM STEERER.



MADE IN TWO SIZES

Are easy to adjust and can be handled by any one.
The Steerer can be arranged to set in pilot house or aft.
No Steerer will be sold without a quadrant.
Steerer will be sold on approval.

Manufactured by
SHERIFFS MFG. CO.
126-130 Barclay Street,
MILWAUKEE, WIS.

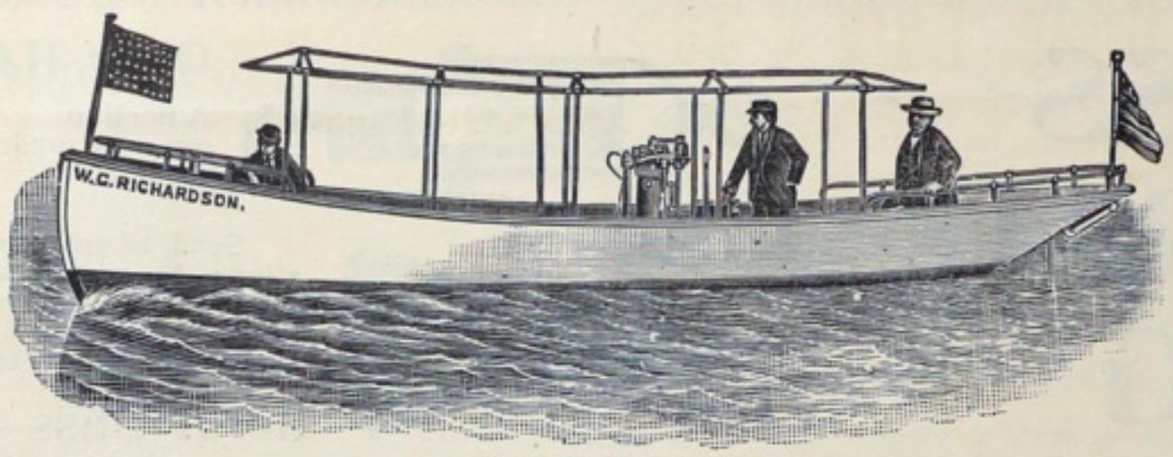


The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.



Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

Engines of the stationary type built for every purpose where a reliable and efficient power is required.

NAPHTHA LAUNCH W. C. RICHARDSON, (Engine 8 horse power—speed 8 miles an hour.)

BUILT BY THE . . . . . McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.

THE

Swain Wrecking Co.

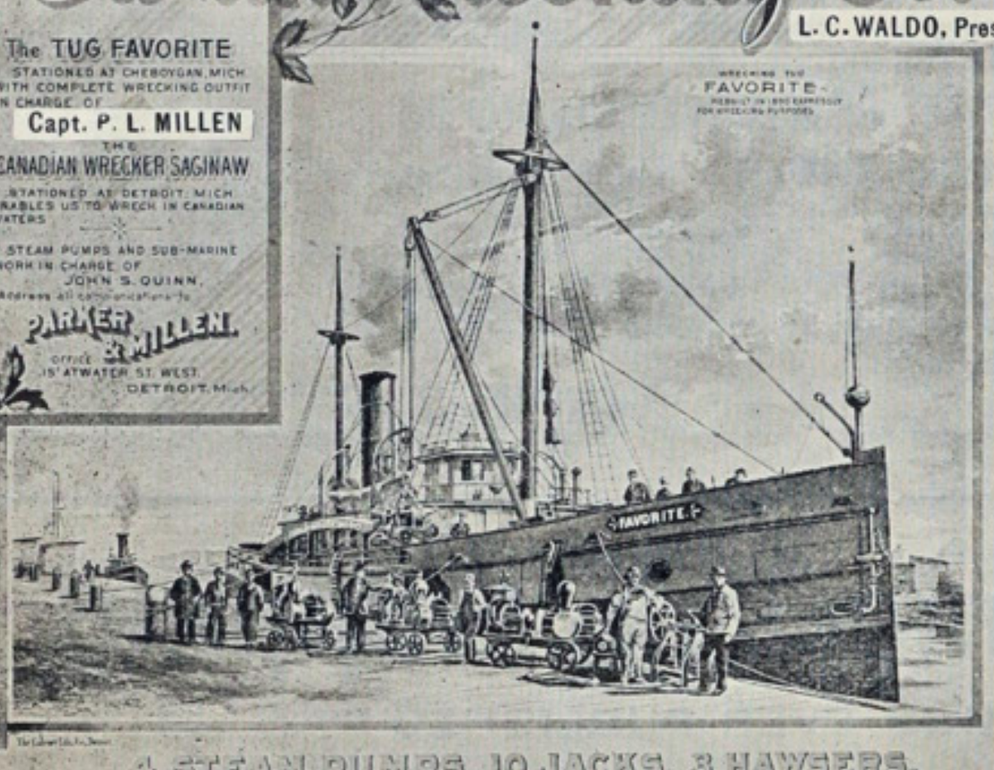
L. C. WALDO, Pres.

The TUG FAVORITE
STATIONED AT CHEBOYGAN, MICH. WITH COMPLETE WRECKING OUTFIT IN CHARGE OF
Capt. P. L. MILLEN

THE
CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH. ENABLES US TO WRECK IN CANADIAN WATERS

STEAM PUMPS AND SUB-MARINE WORK IN CHARGE OF JOHN S. QUINN.

Address all communications to
PARKER & MILLEN.
OFFICE 15 ATWATER ST. WEST
DETROIT, Mich.



4 STEAM PUMPS, 10 JACKS, 3 HAWSERS.

1 COAL and ORE PUMP
3-12 INCH ROTARY.
1-14 INCH WORTHINGTON.

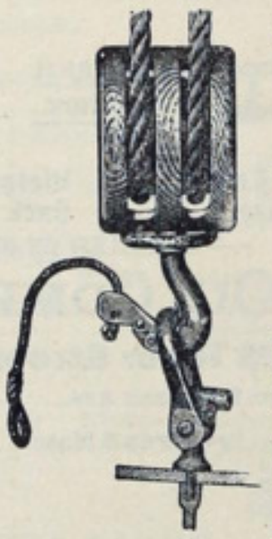
DIVING RIGS AND DIVERS ABOARD AT ALL TIMES

1898 DECEMBER 1898						
SUN	MON	TUES	WED	THUR	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

10-100 TON JACKS
1-12 INCH HAWSER
1-10
1-9

Telegraph
Capt. P. L. MILLEN
CHEBOYGAN, MICH.

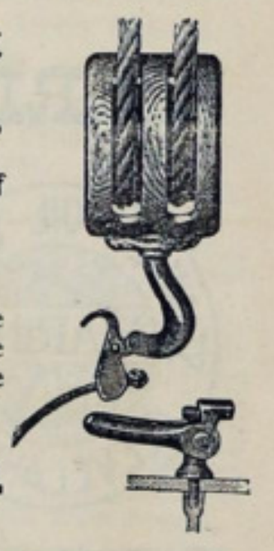
TELEGRAPH
PARKER & MILLEN,
DETROIT, MICH.



Standard Automatic Releasing Device.

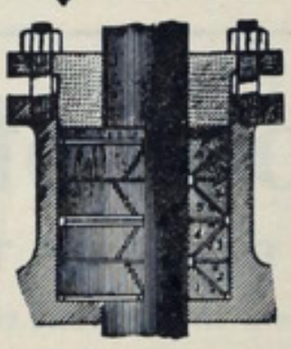
The falls are so rove that both ends of the boat detach, irrespective of which end strikes the water first.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.



Standard Automatic Releasing Hook Co.
22 and 24 State Street, New York.

KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

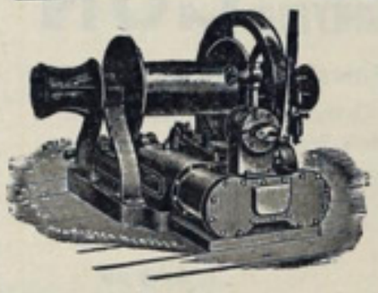
DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

PHOTOGRAPHS OF LAKE AND OCEAN SHIPS.

We have negatives of nearly all large ships on the lakes. Sizes range from 7½x9 inches to 11x14 inches; prices from 75 cents to $1.25. The large prints, 11x14 inches picture size, are the finest ever made on the lakes.

MARINE REVIEW,
418-419 Perry-Payne Bldg., Cleveland.



DOCK and DECK HOISTS

ALL KINDS OF

Machinery & Friction Hoists.

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH,
SAGINAW, MICH.

WILSON & SILSBY, Rowe's Wharf, BOSTON, MASS.

We furnished the Sails for
DEFENDER,
COLONIA,
JUBILEE,
NAVAHOE.

PARTICULAR ATTENTION GIVEN TO

SAILS FOR RACING YACHTS.

ALSO THE

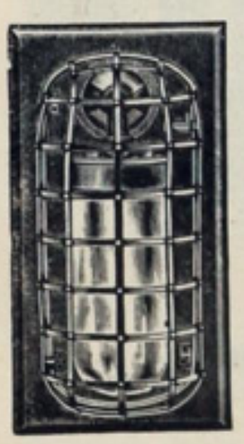
OUTFITS OF LARGE STEAM YACHTS.

Jenkins Standard '96 Packing

weighs 33 1-3 per cent. less than most joint packings, does not **Rot, Burn** or **Blow Out**, and will last longer, therefore the cheapest and best for all purposes.

Good Buyers Compare Weights.
Genuine Stamped Like Cut.

JENKINS BROTHERS,
New York, Boston, Philadelphia, Chicago



Ship Lamps

OIL AND ELECTRIC FIXTURERS

— FOR —

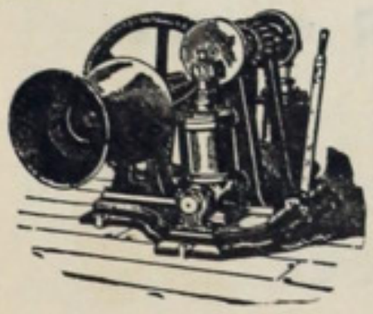
Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.



Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

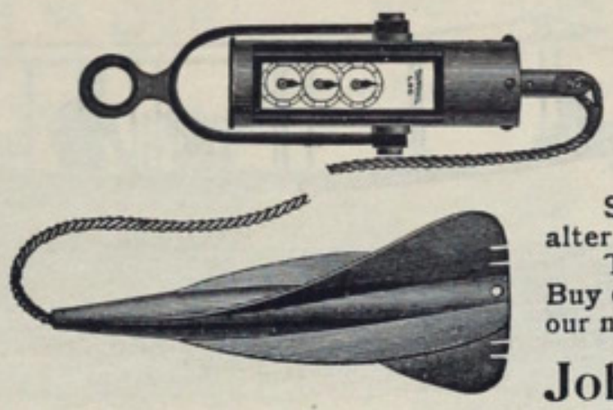
Marine Iron Co., Bay City, Michigan.

FARRAR & TREFTS,

Propeller Yacht and Tug Wheels, Marine and Stationary Engines and Boilers. Repairing Promptly Attended To. Drilling Boilers and Engines a Specialty.

84 to 98 Ferry Street, - - BUFFALO, N. Y.

The—BLISS—
TAFFRAIL
—LOG—



Over 11,000 Sold

A portion are now made to indicate **Statute Miles** for use on the Lakes.

Send us your old Bliss Register, and we will alter it to indicate statute miles for $3.50.

There are poorly made imitations of our rotator. Buy only the Bliss Adjustable Rotator, stamped with our name and patents. For sale by Ship Chandlers.

John Bliss & Co., 128 Front Street, NEW YORK.

MARINE VALVE OIL FOR INTERNAL LUBRICATION. RENOWN ENGINE OIL FOR EXTERNAL LUBRICATION

Marine Valve, Renown Engine, Eldorado Engine, Crank Case, Victor Signal, Dark Lubricating Mineral Seal, Head Light, Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

STANDARD OIL COMPANY'S MARINE DEPOT,

TELEPHONE 77. 123 River Street, CLEVELAND, O. MAIN OFFICE TELEPHONE 682

ALSO FOR SALE BY STANDARD OIL COMPANY,

Chicago, Ill., No. 5 Wabash Ave.
Racine, Wis.
Milwaukee, Wis., Broadway & Mason.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.
Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.
West Superior, Wis.
Hancock, Mich.
Marquette, Mich.
Buffalo, N. Y.
Sault Ste. Marie, Mich.
West Bay City, Mich., M.C.Ry. & 10th St
Saginaw, Mich., Eighth & Sears Sts.
Detroit, Mich., 46 Jefferson.
Toledo, O., Summit & Monroe Sts.

ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.
EDWARD BRAMHALL, Benton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.
MARINE SUPPLY CO., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY CO., Toledo, O.

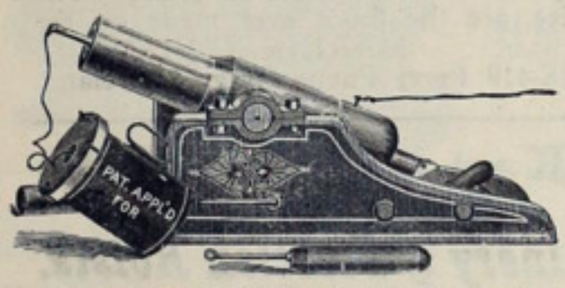
1898 Blue Book of American Shipping

"IS THE BEST BOOK OF THE KIND EVER PUBLISHED"

A Directory of Shipping Concerns throughout the United States.—A Reliable Statistical Publication.

ORDER A COPY, Price $5, and if you are not satisfied with the book, we will pay express both ways and return the $5.

BLUE BOOK OF AMERICAN SHIPPING,
418-419 Perry-Payne Building, CLEVELAND O.



LYLE PATENT LIFE-SAVING LINE-CARRYING GUN

For Steamships and Vessels.

Also for throwing a life-line to a wreck from the shore

Furnished by us to the different ships of the Cunard, Pacific Mail, Warren, Leyland and other principal lines; also to Chapman Wrecking Co. of New York, and others.
No steamship or large Yacht should be without one of these guns.
Send for descriptive circular.

Price of large Gun, complete with line and outfit.....$115 00
Smaller size, to be used from the shoulder, especially suitable for Tow Boats, complete..... 25.00

WM. READ & SONS, 107 Washington Street, BOSTON, MASS.

EVERY MARINE ENGINEER ON THE LAKES, and every second who is studying for first class papers, ought to possess

Reed's Engineers' Hand Book,

(Fifteenth Edition,)

Containing 600 engravings and a portfolio of drawings of all parts of marine engines.

It has always sold for $4.50 and $5. Until May 1 any subscriber to the REVIEW may have a copy sent post paid by enclosing this advertisement and $4 to

MARINE REVIEW,
BOOK DEPT. 418-419 Perry-Payne Bldg., CLEVELAND, O.

Nickel Plate Ahoy? Aye, Aye Sir!
The line to hail and the line to take
To reach your craft to fit her out,
Is the well-known ship-shape Nickel Plate Route,
Chicago, Cleveland, Buffalo,
Or any port you want to go,
The shortest time and the lowest rate
Are shipmates with the Nickel Plate.

A SUPERB DINING CAR SERVICE.

For particulars inquire of

A. W. JOHNSTON, Gen'l Supt.
or, B. F. HORNER, Gen'l Pass. Agt.

CLEVELAND, O.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, published by the Marine Review, 418-419 Perry-Payne Bldg., Cleveland.
See accompanying index of advertisers for full addresses of concerns in this directory.

ARTIFICIAL DRAFT FOR BOILERS.
Detroit Dry Dock Co.....Detroit.
B. F. Sturtevant Co.....Boston.
Globe Iron Works Co.....Cleveland.
H. Bloomsburg & Co.....Newport News, Va.

ADJUSTERS OF INSURANCE.
Johnson & Higgins.....Buffalo.
Chas. E. & W. F. Peck.....Chicago.

ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

ANTI-FRICTION METALS.
Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Wm. Cramp & Sons.....Philadelphia.

ASBESTOS.
H. W. Johns Mnfg. Co.....New York.

ATTORNEYS AND PROCTORS IN ADMIRALTY.
Harvey L. Brown.....Buffalo.
Harvey D. Goulder.....Cleveland.
Albert J. Gilchrist.....Cleveland.
Orestes C. Pinney.....Clevelnad.
Hoyt, Dustin & Kelley.....Cleveland.
White, Johnson, McCaslin & Cannon.....Cleveland.
Mackey & Bell.....Buffalo.

BOILER MANUFACTURERS.
Almy Water Tube Boiler Co.....Providence, R. I.
Detroit Screw Works.....Detroit.
Farrar & Trefts.....Buffalo.
Wm. Cramp & Sons.....Philadelphia.
W. & A. Fletcher Co.....Hoboken, N. J.
Gas Engine & Power Co.....Morris Heights, N. Y.
Mackinnon Mfg. Co.....Bay City, Mich.
Babcock & Wilcox Co.....New York.
Roberts Safety Water Tube Boiler Co...New York.
S. F. Hodge & Co.....Detroit.
Kling Bros.....Chicago.
Chicago Ship Building Co.....Chicago.
Dry Dock Engine Works.....Detroit
Cleveland Ship Building Co.....Cleveland
Globe Iron Works Co.....Cleveland.
Pusey & Jones Co.....Wilmington, Del
Newport News Ship Bldg. Co...Newport News, Va.

BOILER CIRCULATORS.
H. Bloomsburg & Co.....Newport News, Va.

BOILER PLATES.
Bourne-Fuller Co.....Cleveland

BOILER TUBES, SEAMLESS, COLD DRAWN.
Shelby Steel Tube Co.....Cleveland

BOILER FURNACES, FIRE FRONTS, ETC.
Continental Iron Works.....New York.

BOILER AND PIPE COVERING.
H. W. Johns Mfg. Co.....New York

BOILER STAYBOLT IRON.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O

BUCKETS, ORE AND COAL.
McMyler Mnfg. Co.....Cleveland
Brown Hoisting & Conveying Mach. Co..Cleveland

BEAM ENGINES.
W. & A. Fletcher Co.....Hoboken, N. J

BLOCK MANUFACTURERS.
Cleveland Block Co.....Cleveland

BLOWERS FOR FORCED DRAFT.
American Blower Co.....Detroit
B. F. Sturtevant Co.....Boston

BAROMETERS, MARINE GLASSES, ETC.
John Bliss & Co.....New York
Also most of the ship chandlers.

BOAT BUILDERS.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York
Thos. Drein & Son.....Wilmington, Del.

BROKERS.
See Vessel Agents.

BOLTS—HOLLOW SAFETY STAYBOLTS.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.
Chas. Cory & Son.....New York
Standard Brass Works.....Kalamazoo, Mich
Wm. Cramp & Sons.....Philadelphia.
Magnolia Metal Co.....New York
Detroit Sheet Metal & Brass Works.....Detroit

BRIDGES, BUILDINGS, STRUCTURAL WORK.
Berlin Iron Bridge Co.....East Berlin, Conn.

CABIN AND CABINET FINISHING WOODS.
Martin-Barriss Co.....Cleveland

CHAINS.
P. Hayden S. H. Co.....Columbus, O
James McKay & Co.....Pittsburgh, Pa
J. B. Carr Co.....Troy, N. Y.
Lebanon Chain Works.....Lebanon, Pa.

CLASSIFICATION OF VESSELS.
Great Lakes Register.....Chicago.

COAL SHIPPERS.
Cuddy-Mullen Coal Co.....Cleveland
M. A. Hanna & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co....Buffalo.
Pittsburgh & Chicago Gas Coal Co.....Cleveland.
Osborne, Saeger & Co.....Cleveland.
Castner, Curran & Bullitt.....Philadelphia.

COAL AND ORE HANDLING MACHINERY.
Brown Hoisting & Conveying Mach. Co..Cleveland.
McMyler Mnfg. Co.....Cleveland.
Lidgerwood Mnfg. Co.....New York.

COMPASSES.
John Bliss & Co.....New York.
L. Black & Co.....Detroit.

CAPSTANS.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

COPPER AND SHEET IRON WORK.
Detroit Sheet Metal & Brass Works.....Detroit.
Pusey & Jones Co.....Wilmington, Del.

COMPASS ADJUSTER.
Geo. A. Simpson.....Sault Ste. Marie, Mich.

CRANES.
Brown Hoisting & Conveying Mach. Co..Cleveland.
McMyler Mnfg. Co.....Cleveland.
Lidgerwood Mnfg. Co.....New York.

CONDENSERS.
See pumps.

CONTRACTORS FOR PUBLIC WORKS.
Cleveland Dredge Co.....Cleveland.

CORDAGE.
See ship chandlers.

CORK JACKETS AND RINGS.
Armstrong Cork Co.....Pittsburgh, Pa.

DIVING APPARATUS.
A. J. Morse & Son.....Boston.

DREDGING AND DOCK CONTRACTORS.
Cleveland Dredge Co.....Cleveland.

DRY DOCKS.
American Steel Barge Co.....West Superior, Wis.
Chicago Ship Building Co.....Chicago.
Wm. Cramp & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Detroit Dry Dock Co.....Detroit.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Bldg. Co...Newport News, Va.
Pusey & Jones Co.....Wilmington, Del.
Ship Owners' Dry Dock Co.....Cleveland
Cleveland Ship Building Co.....Lorain.
Union Dry Dock Co.....Buffalo.

ENGINE BUILDERS, MARINE.
Farrar & Trefts.....Buffalo.
W. & A. Fletcher Co.....Hoboken, N. J.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York
S. F. Hodge & Co.....Detroit
Mackinnon Mnfg. Co.....Bay City, Mich
Pusey & Jones Co.....Wilmington, Del.
Newport News Ship Bldg Co...Newport News, Va
Wm. Cramp & Sons.....Philadelphia.
Roach's Ship Yard.....Chester, Pa.
B. F. Sturtevant Co.....Boston.
Globe Iron Works Co.....Cleveland.
Cleveland Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
H. G. Trout.....Buffalo.
Dry Dock Engine Works.....Detroit.
American Steel Barge Co.....West Superior, Wis.
Chicago Ship Building Co.....Chicago.
Sheriffs Mnfg. Co.....Milwaukee.

ENGINE ROOM TELEGRAPH.
Chas. Cory & Son.....New York.
Chadburn & Son.....11 Waterloo Rd., Liverpool.

ENGINEERS' SUPPLIES.
Detroit Sheet Metal & Brass Works.....Detroit.
Chase Machine Co.....Cleveland.

ELECTRIC LIGHT AND POWER PLANTS.
General Electric Co.....Schenectady, N. Y.
B. F. Sturtevant Co.....Boston.

ELECTRIC HOISTS.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.

ENGINEERS, CONSULTING (MECHANICAL AND MARINE).
Miers Coryell.....New York
John Haug.....Philadelphia
Ambrose V. Powell.....Chicago
W. J. Wood.....Chicago
Gustav Hillman.....Brooklyn.
Walter Miller.....Cleveland
Joseph R. Oldham.....Cleveland

FORGES FOR RIVET HEATING.
Crumlish Forge Co.....Buffalo.

FANS FOR VENTILATION.
American Blower Co.....Detroit.
B. F. Sturtevant Co.....Boston.

FEED WATER PURIFIER AND HEATERS.
Robert Learmonth.....Buffalo.

FORGINGS, IRON AND STEEL.
Cleveland City Forge & Iron Co.....Cleveland.
Bethlehem Iron Co.....South Bethlehem.
Bourne-Fuller Co.....Cleveland.

FLUSHOMETERS.
Kenney Co., The.....New York.

FORWARDERS OF FREIGHT.
Thomas Wilson.....Cleveland
C. H. Tucker.....Cleveland.
Bessemer Steamship Co.....Cleveland

FUELING COMPANIES AND COAL DEALERS.
Cuddy-Mullen Coal Co.....Cleveland.
James Graham & Co.....Detroit.
M. A. Hanna & Co.....Cleveland.
Mark H. Hanlon.....Cleveland.
Pickands, Mather & Co.....Cleveland.
O. S. Richardson Fueling Co.....Chicago.
Stanley B. Smith & Co.....Detroit.
Pittsburgh & Chicago Gas Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co....Buffalo.
Port Royal Dock Co.....Sault Ste. Marie, Mich
Youghiogheny & Lehigh Coal Co.....Chicago.
Osborne, Saeger & Co.....Cleveland.
Castner, Curran & Bullitt (Pocahontas).....Philadelphia.

FLAGS AND BUNTING.
See ship chandlers.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.
Wm. Porter's Sons.....New York.
Page Bros. & Co.....Boston.

FURNACES FOR BOILERS.
Continental Iron Works.....New York.

GAS BUOYS.
Safety Car Heating & Lighting Co.....New York.

GAS ENGINES.
McMyler Mnfg. Co.....Cleveland.

GLASSES, MARINE.
See ship chandlers and nautical instruments.

GAUGES, STEAM.
Crosby Steam Gauge & Valve Co.....Boston.
See also valves and engineers' supplies.

GRAPHITE.
Joseph Dixon Crucible Co.....Jersey City, N. J

GREASE CUPS.
See engineers' supplies.

GRAIN WEIGHMASTER AT CHICAGO.
Foss, H. A., of Chicago Board of Trade....Chicago.

HEATERS, STEAM.
American Blower Co.....Detroit.

HARDWARE, MARINE.
L. W. Ferdinand & Co.....Boston.
Detroit Sheet Metal & Brass Works.....Detroit.

HOISTING ENGINES.
Chase Machine Co.....Cleveland.
S. F. Hodge & Co.....Detroit.
Jackson & Church.....Saginaw.
Lidgerwood Mnfg. Co.....New York.
Marine Iron Co.....Bay City.
Globe Iron Works Co.....Cleveland.
Williamson Bros.....Philadelphia.
Hyde Windlass Co.....Bath, Me.

HOSE FOR DECK AND FIRE PURPOSES.
The Manhattan Rubber Mnfg. Co.....New York, Cleveland and Chicago.

HAMMERS, POWER DROP.
Chase Machine Co.....Cleveland.

HOTELS.
Weddell House.....Cleveland

INDICATORS, CALL BELLS.
Chas. Cory & Son.....New York.
Chadburn & Sons.....11 Waterloo Rd., Liverpool.

INJECTORS.
Jenkins Bros.....New York.

INSURANCE, MARINE.
Chas. E. & W. F. Peck.....New York and Chicago.
Johnson & Higgins.....Main office in New York.
Insurance Co. of North America, represented by Geo. L. McCurdy.....Chicago.
Brown & Co.....Buffalo.
C. W. Elphicke & Co.....Chicago.
J. G. Keith & Co.....Chicago.
La Salle & Co.....Duluth.
Parker & Millen.....Detroit.
Mitchell & Co.....Cleveland.
W. C. Richardson.....Cleveland.
Hawgood & Moore.....Cleveland.
John Gordon & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Hutchinson & Co.....Cleveland.
C. R. Jones & Co.....Cleveland.
J. H. Bartow.....Cleveland.

IRON ORE AND PIG IRON.
M. A. Hanna & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Bourne-Fuller Co.....Cleveland.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co.....Boston.
Detroit Sheet Metal & Brass Works.....Detroit.
Thos. Drein & Son.....Wilmington, Del.
D. Kahnweiler.....New York.

LIFE-SAVING LINE-CARRYING GUN.
Wm. Read & Sons.....Boston.

LIGHTS, PORTABLE, SELF-CONTAINED.
The Wells Light Mnfg. Co.....New York.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co.....Boston.
Wm. Porter's Sons.....New York.

MANILA ROPE.
Upson-Walton Co.....Cleveland.
H. H. Baker & Co.....Buffalo.

METALLIC PACKING.
U. S. Metallic Packing Co.....Philadelphia.
L. Katzenstein & Co.....New York.

MARINE TELEGRAPH.
Chas. Cory & Son.....New York.
Chadburn & Son.....11 Waterloo Rd., Liverpool.

METALS FOR BEARINGS.
Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd...Philadelphia
Wm. Cramp & Sons.....Philadelphia.

MAGNOLIA METAL.
Magnolia Metal Co.....New York.

METALLIC LIFE BOATS.
Thos. Drein & Son.....Wilmington, Del.
D. Kahnweiler.....New York

MARINE GLUE.
L. W. Ferdinand & Co.....Boston

NAUTICAL INSTRUMENTS.
John Bliss & Co.....New York
Also most of the ship chandlers.

NAPHTHA LAUNCHES.
Gas Engine & Power Co.....New York.

NAUTICAL SCHOOL.
Chicago Nautical School.....Chicago.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

NAVAL ARCHITECTS.

Frank E. Kirby .....Detroit.
W. J. Wood .....Chicago.
Gustav Hillman .....Brooklyn.
John Haug .....Philadelphia.
Joseph R. Oldham .....Cleveland.
Robert Curr .....Cleveland.

OAK TIMBER AND PLANK.

Martin-Barriss Co. .....Cleveland.

OILS AND LUBRICANTS.

Jos. Dixon Crucible Co.....Jersey City, N. J.
Lake Carriers' Oil Co.....Cleveland.
Standard Oil Co. .....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates.....Cleveland.
Wm. M. Monroe.....Cleveland.

PNEUMATIC TOOLS.

Chicago Pneumatic Tool Co.....Chicago.

POCAHONTAS COAL.

Castner, Curran & Bullitt.....Philadelphia.

PROPELLER WHEELS.

Dry Dock Engine Works .....Detroit.
Cleveland Ship Building Co.....Cleveland.
Globe Iron Works Co.....Cleveland.
Farrar & Trefts .....Buffalo.
Newport News Ship Bldg. Co...Newport News, Va.
Pusey & Jones Co.....Wilmington, Del.
S. F. Hodge & Co.....Detroit.
Wm. Cramp & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.. Philadelphia.
Mackinnon Mnfg. Co.....Bay City.
Sheriffs Mnfg. Co.....Milwaukee.
H. G. Trout .....Buffalo.
Hyde Windlass Co.....Bath, Me.

PRESSURE REGULATORS AND REDUCING VALVES.

G. M. Davis & Co.....Chicago.
Foster Engineering Co.....Newark, N. J.

PIPE, WROUGHT IRON.

Bourne-Fuller Co. .....Cleveland.

PACKING.

A. W. Chesterton & Co.....Boston.
H. W. Johns Mfg. Co.....New York.
Jenkins Bros. .....New York.
L. Katzenstein & Co.....New York.
Manhattan Rubber Mfg. Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.
Peerless Rubber Mfg. Co.....New York.

PAINTS.

Upson-Walton Co. .....Cleveland.
Howard H. Baker & Co.....Buffalo.

PUMPS, STEAM.

Geo. F. Blake Mfg. Co.....New York.
Henry R. Worthington.....New York.
Davidson, M. T. .....Brooklyn, N. Y.

PUMPS, ELECTRIC.

General Electric Co.....Schenectady, N. Y.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Aut. Releasing Hook Co.....New York.

RIVETS, STEEL.

Bourne-Fuller Co. .....Cleveland.

RUBBER GOODS FOR STEAMERS.

Manhattan Rubber Mfg. Co.....
.....New York and Cleveland.
Peerless Rubber Mfg. Co.....New York.

RUBBER INSULATED WIRES.

John A. Roebling's Sons..New York and Cleveland.

SAIL MAKERS.

Wilson & Silsby .....Boston.
Howard H. Baker & Co.....Buffalo.
Upson-Walton Co. .....Cleveland.

SHIP PLATES AND SHAPES, STEEL.

Bourne-Fuller Co. .....Cleveland.

SALVAGE COMPANIES.

See wrecking companies.

STAYBOLT IRON, Hollow and Solid.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

SEARCH LIGHTS.

General Electric Co.....Schenectady, N. Y.

STEAMSHIP LINES, PASS. AND FREIGHT.

Cleveland & Buffalo Transit Co.....Cleveland.
Detroit & Cleveland Navigation Co.....Detroit.
Goodrich Transportation Co. .....Chicago.
Lackawanna-Green Bay Line, C. H. Tucker....
..... Cleveland.
Lake Michigan & Lake Superior Trans. Co.Chicago.
Northern Steamship Co. .....Buffalo.
Ogdensburg Transit Co.....Ogdensburg, N. Y.
Northern Transit Co.....Cleveland.
Graham & Morton Trans. Co .....Chicago.

SURVEYORS, MARINE.

Robert Curr .....Cleveland.
Capt. D. McLeod .....Cleveland.
Joseph R. Oldham .....Cleveland.

SHIP CHANDLERS.

Howard H. Baker & Co.....Buffalo.
Upson-Walton Co. .....Cleveland.

STEAM, VACUUM AND HYDRAULIC SPECIALTIES.

William Craig .....New York.

SHIP BUILDERS.

American Steel Barge Co.....West Superior, Wis.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Dry Dock Co.....Detroit.
Wm. Cramp & Sons.....Philadelphia.
Newport News Ship Bldg. Co....Newport News, Va.
Cleveland Ship Building Co.....Cleveland.
Globe Iron Works Co.....Cleveland.
Roach's Ship Yard..... Chester, Pa.
Pusey & Jones Co.....Wilmington, Del.
Union Dry Dock Co.....Buffalo.

STOCKLESS ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STEERING ENGINES.

Pawling & Harnischfeger .....Milwaukee.
Sheriffs Mfg. Co. .....Milwaukee.
Chase Machine Co. .....Cleveland
Globe Iron Works Co.....Cleveland.
Williamson Bros. .....Philadelphia
Hyde Windlass Co.....Bath, Me.

STEAM VESSELS FOR SALE.

Samuel Holmes.....New York.

TRAPS, STEAM.

Wm. S. Haines Co.....Philadelphia.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Bement, Miles & Co.....Philadelphia.
Chicago Pneumatic Tool Co.....Chicago.
Hilles & Jones Co .....Wilmington, Del.
New Doty Mnfg. Co.....Janesville, Wis.
Long & Allstatter.....Hamilton, Ohio.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.

TOWING COMPANIES.

Barry Bros. Independent Tug Line.....Chicago.
Escanaba Towing & Wrecking Co..Escanaba, Mich.
The Vessel Owners' Towing Co.....Cleveland.
Dunham Towing & Wrecking Co.....Chicago.

TUBING, COPPER AND BRASS.

Randolph & Clowes .....Waterbury, Conn.

TRIMMING DEVICE FOR ORE CARRIERS.

Mack, Wm. H..... .....Cleveland.

VALVES.

Crosby Steam Gauge & Valve Co.....Boston.
Jenkins Bros. .....New York.
G. M. Davis Co.....Chicago.
Foster Engineering Co.....Newark, N. J.

VESSEL AND FREIGHT AGENTS.

Brown & Co. .....Buffalo.
J. H. Bartow .....Cleveland.
Drake & Maytham .....Buffalo.
C. W. Elphicke & Co.....Chicago.
John Gordon & Co.....Buffalo.
Hawgood & Moore .....Cleveland.
Hutchinson & Co. .....Cleveland.
C. R. Jones & Co.....Cleveland.
Mitchell & Co. .....Cleveland.
W. C. Richardson .....Cleveland.
Samuel Holmes .....New York.

WIRE ROPE.

John A. Roebling's Sons..New York and Cleveland.
Upson-Walton Co. .....Cleveland.
H. H. Baker & Co.....Buffalo.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

WHISTLES, STEAM.

Crosby Steam Gauge & Valve Co.....Boston.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.
Globe Iron Works Co.....Cleveland.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co..... Bath, Me.

WRECKING AND SALVAGE COMPANIES.

Escanaba Towing & Wrecking Co..Escanaba, Mich.
Donnelly Salvage & Wrecking Co....Kingston, Ont.
Swain Wrecking Co. .....Detroit.
Vessel Owners' Towing Co.....Cleveland.
Dunham Towing & Wrecking Co. .....Chicago.

YACHT BOILERS.

Detroit Screw Works.....Detroit.

YACHT PLUMBERS.

Alfred B. Sands & Son.....New York.

YACHT SAILS.

Wilson & Silsby .....Boston.

YACHT AND BOAT BUILDERS.

Thos. Drein & Son.....Wilmington, Del.
Gas Engine & Power Co.....New York.

YACHT, BOAT AND CANOE HARDWARE.

L. W. Ferdinand & Co.....Boston.

YAWLS.

Thos. Drein & Son.....Wilmington, Del.

Alphabetical List of Marine Review Advertisers.

The star (*) indicates that the advertisement appears alternate weeks.

Almy Water Tube Boiler Co..... 22
American Blower Co..... 28
American Ship Windlass Co..... 2
American Steel Barge Co..... 7
Armstrong Cork Co..... 28
Babcock & Wilcox Co..... 7
Baldt Anchor Co..... 20
Barry Bros. Independent Tug Line.. 7
Baker, Howard H. & Co..... 21
Bartow, J. H..... 4
Bement, Miles & Co..... 22
Berlin Iron Bridge Co..... 22
Bessemer Steamship Co..... 18
Bethlehem Iron Co..... 6
Bourne-Fuller Co. 17
Blake, Geo. F., Mfg. Co..... 19
*Bliss, John & Co..... 24
Bloomsburg, H. & Co..... 7
Brown & Co..... 18
Brown & Co..... 4
Brown Hoisting & Conveying Machine Co. 2
Brown, Harvey L..... 4
Carr, J. B. Co..... 21
Castner, Curran & Bullitt..... 27
*Chesterton, A. W. & Co..... 20
*Chadburn & Sons..... 28
Chase Machine Co. 6
Chicago Pneumatic Tool Co..... 20
Chicago Ship Building Co..... 2
Cleveland City Forge & Iron Co..... 7
Cramp, Wm., & Sons..... 1
Cleveland Ship Building Co..... 1
C., C. C. & St. L. Ry..... 27
Continental Iron Works..... 2
Coryell, Miers 4
Cory, Chas. & Son..... 22
*Craig Ship Building Co..... 24
Craig, William 20
Crosby Steam Gauge & Valve Co... 8
Cuddy-Mullen Coal Co..... 5
Chicago Nautical School..... 22
Curr, Robert 4
Crumlish Forge Co. 18
Detroit Dry Dock Co..... 1
Detroit Screw Works..... 19
Davidson, M. T..... 21
Detroit Sheet Metal & Brass Works 19
Dixon, Jos., Crucible Co..... 21
Donnelly Salvage & Wrecking Co... 7
Drake & Maytham..... 4
Drein, Thos. & Son..... 19
Dry Dock Engine Works..... 3
Dunham Towing & Wrecking Co.... 27
Elphicke, C. W. & Co..... 4
Eophone Co. 5
Escanaba Towing & Wrecking Co... 19
Farrar & Trefts 23
Falls Hollow Staybolt Co..... 6
Farasey & Marron..... 23
Ferdinand, L. W. & Co..... 21
Fletcher, W. & A. Co..... 28
*Foster Engineering Co. 17
Foss, H. A. 8
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.. 20
General Electric Co..... 6
Gilchrist, Albert J..... 4
Globe Iron Works Co..... 1
Goulder, Harvey D..... 4
Gordon, John & Co..... 4
Graham, James & Co..... 5
Haines, Wm. S. & Co..... 8
Hanna, M. A. & Co..... 19
Hanlon, Mark H..... 5
Haug, John 4
Hawgood & Moore..... 4
Hayden, P., S. H. Co..... 19
Herriman, F. D..... 18
*Hilles & Jones Co..... 6
Hillman, Gustav 4
Hodge, S. F. & Co..... 7
Holmes, Samuel 4
Hoyt, Dustin & Kelley..... 4
Hutchinson & Co..... 4
Hyde Windlass Co..... 28
Insurance Co. of North America.... 18
International Anchor Co..... 21
Jackson & Church..... 23
Jenkins Brothers 22-23
Johns, H. W. Mfg. Co..... 1
Johnson & Higgins..... 6
Jones, C. R. & Co..... 4
Kahnweiler, D. 22
Katzenstein, L. & Co..... 23
*Kenney Co., The, New York..... 17
Keith, J. G. & Co..... 18
Kling Bros., Chicago..... 22
Lackawanna-Green Bay Line..... 4
Lebanon Chain Works..... 18
Long & Allstatter..... 8
L. S. & M. S. Ry..... 27
*Lake Carriers' Oil Co..... 20
La Salle & Co..... 18
*Learmonth, Robert 24
Lidgerwood Mfg. Co..... 6
McKay, James & Co..... 17
McLeod, D. 4
McMyler Mfg. Co..... 23
Mackinnon Mfg. Co..... 22
Magnolia Metal Co..... 1
Manhattan Rubber Mfg. Co..... 18
Marine Iron Co..... 23
Martin-Barriss Co. 21
Miller, Walter 20
Monroe, Wm. M..... 4
Mackey & Bell 4
Milwaukee Dry Dock Co..... 28
Mitchell & Co..... 4
Morse, A. J. & Son..... 22
Mack, Wm. H..... 27
Newport News Ship Building & Dry Dock Co..... 18
New York, Chicago & St. Louis Ry 24
Northern Steamship Co..... 4
New Doty Mfg. Co..... 8
Ohio Supply Co..... 21
Oldham, J. R..... 4
Ogdensburg Transit Co..... 4
Page Bros. & Co..... 23
Parker & Millen..... 18
Pawling & Harnischfeger..... 22
Peck, Charles E. & W. F..... 18
Peerless Rubber Mfg. Co..... 8
Phosphor Bronze Smelting Co., Ltd. 21
Pickands, Mather & Co..... 21
Pinney, Orestes C..... 4
Pittsburgh & Chicago Gas Coal Co. 19
Powell, Ambrose V..... 4
Port Royal Dock Co..... 5
Porter's, Wm., Sons..... 19
Pusey & Jones Co..... 18
Randolph & Clowes 1
*Read & Sons, Wm. 24
Richardson, W. C..... 4
Richardson, O. S., Fueling Co..... 5
Roach's Ship Yard..... 18
Roberts Water Tube Boiler Co..... 19
*Roebling's, John A., Sons Co..... 28
Rochester & Pittsburgh Coal & Iron Co. 5
Safety Car Heating & Lighting Co. 20
Sands, Alfred B. & Son..... 22
Sheriffs Mfg. Co..... 22
Shelby Steel Tube Co..... 5
Ship Owners' Dry Dock Co..... 28
Smith, Stanley B., & Co..... 17
Standard Oil Co..... 24
Standard Brass Works..... 18
Standard Automatic Releasing Hook Co. 23
Sturtevant, B. F. Co..... 28
Swain Wrecking Co..... 23
Trout, H. G..... 21
Tucker, C. H..... 4
Thurston & Bates..... 4
U. S. Metallic Packing Co..... 21
Union Dry Dock Co..... 2
Upson-Walton Co. 28
Vessel Owners' Towing Co..... 27
Wells Light Mfg. Co..... 6
White, Johnson, McCaslin, Cannon. 4
Williamson Bros. 20
Wilson & Silsby..... 23
Wilson, Thomas 4
Wood, W. J..... 4
Worthington, Henry R..... 2
Weddell House 27
Youghiogheny & Lehigh Coal Co.... 19

WHAT DO YOU PAY

FOR A HORSE POWER?

THAT'S THE IMPORTANT QUESTION
AMONG SHIP OWNERS.

A UNIT OF POWER FOR A POUND AND A HALF OF COAL PER HOUR !

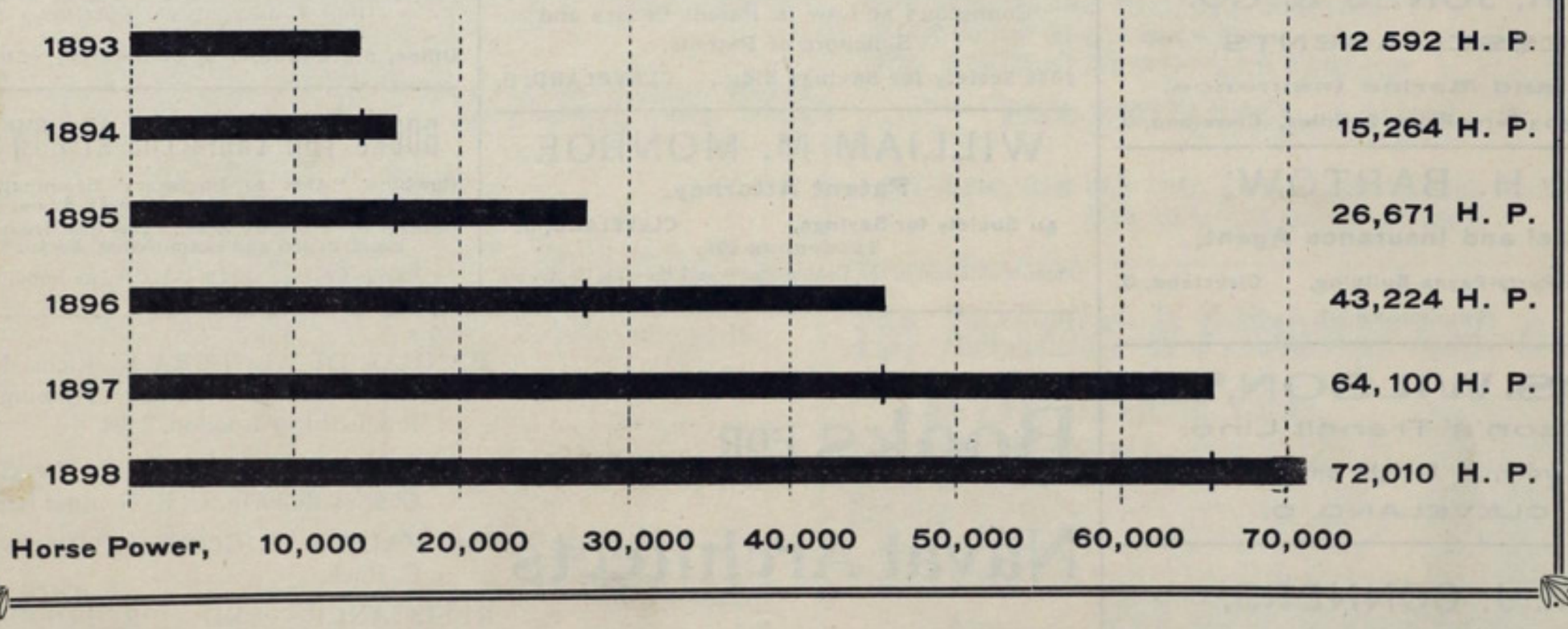
SUCH IS THE RECORD OF A MODERN FREIGHTER, THE WESTERN TRANSIT CO.'S STEAMER TROY, EQUIPPED WITH QUADRUPLE EXPANSION ENGINES AND

HOWDEN HOT DRAFT.

MORE ADDITIONS ARE MADE IN THE LIST OF HOWDEN SHIPS, REVISED TO DATE IN THE FOLLOWING SUMMARY:

	STEAMERS.	HORSE POWER.
Total installations of Howden draft throughout the world,	848	2,383,900
Total installations by Dry Dock Engine Works, Detroit,	58	72,010

Diagram showing Increase of Howden Equipment by Dry Dock Engine Works, Detroit.



CONSULT DRY DOCK ENGINE WORKS, DETROIT, MICH.

VESSEL AND INSURANCE AGENTS.

C. W. ELPHICKE & CO.
General Insurance Agents,

C. W. ELPHICKE.
JAS. A. MYERS.
CALVIN CARR.

Room 10, No. 6 Sherman St.,
CHICAGO, ILL.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.

MITCHELL & CO.
Vessel and Insurance Agents,

508, 509 & 510 Perry-Payne Building, Cleveland, O.
Office Telephone 767. Residence, John Mitchell, Doan 341.
John F. Wedow, 158 L. Alfred Mitchell, Doan 197 J.

W. C. RICHARDSON,
VESSEL AND MARINE INSURANCE AGENT,

Office Telephone 338. Residence Telephone 2938.
606 and 607 Perry-Payne Bldg., Cleveland, O.

BROWN & CO.
J. J. H. BROWN.
J. B. RODGERS.
EDWARD SMITH.

Vessel and Insurance Agents,
202 Main Street, Buffalo, N. Y.

W. A. HAWGOOD. J. W. MOORE.

HAWGOOD & MOORE,
Vessel and Insurance Agents,

Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395.
608 Perry-Payne Building, CLEVELAND, O.

JOHN GORDON & CO.
Vessel, Freight and Insurance Agents,

JOHN GORDON.
J. H. KELLERAN.
H. L. CHAMBERLIN.

1132 Guaranty Building,
BUFFALO, N. Y.

CAPT. M. M. DRAKE,
Long Distance Telephone:
Office, Seneca 81.
Residence, Bryant 431.

G. W. MAYTHAM,
Long Distance Telephone:
Office, Seneca 1660.
Residence, 2615 Bryant.

DRAKE & MAYTHAM,
Vessel and Insurance Agents,
No. 1 Main Street, BUFFALO, N. Y.

LAKE TRANSPORTATION
C. H. TUCKER, General Agent.

LINES REPRESENTED: The Northern Steamship Company, Lackawanna Green Bay Line, Ogdensburg Transit Co.
Office, Dock and Warehouse, Lake Front, Foot of Water Street.

HUTCHINSON & CO.
Vessel and Insurance Agents.

Office Telephone, Main 2453.
Residence C. L. Hutchinson, Doan 193.
C. L. HUTCHINSON.
W. H. McGEAN.
412 Perry-Payne Building,
CLEVELAND, O.

C. R. JONES & CO.
VESSEL AGENTS,
Fire and Marine Insurance,
501, 502 & 503 Perry-Payne Building, Cleveland, O.

J. H. BARTOW,
Vessel and Insurance Agent,
611 and 612 Perry-Payne Building, Cleveland, O.
TELEPHONE 717.

THOS. WILSON, Managing Owner
Wilson's Transit Line.
Gen. Forwarder, Freight and Vessel Agent,
CLEVELAND, O.

W. J. CONNERS,
OFFICES: BUFFALO, CHICAGO, MILWAUKEE, GLADSTONE.
Contractor,
BUFFALO, N. Y.

VESSEL AND INSURANCE AGENTS.

SAMUEL HOLMES,
Steamship Offices,
For Selling, Chartering and Building all classes Steam Vessels.
Steam Vessel Circulars. Weekly Freight Circulars.
Morris Building, 66 & 68 Broad Street, NEW YORK.

PROCTORS IN ADMIRALTY.

HARVEY D. GOULDER,
Lawyer and Proctor in Admiralty,
CLEVELAND, O.

ALBERT J. GILCHRIST,
PROCTOR IN ADMIRALTY,
604 Perry-Payne Building, CLEVELAND, O.

HARVEY L. BROWN,
Counselor at Law and Proctor in Admiralty,
35 White Building, BUFFALO, N. Y.

HOYT, DUSTIN & KELLEY,
LAWYERS and PROCTORS IN ADMIRALTY,
Offices, 702 Western Reserve Bldg., Cleveland, O.

White, Johnson, McCaslin & Cannon,
ATTORNEYS AT LAW and PROCTORS IN ADMIRALTY,
Blackstone Bldg., Cleveland O.

ORESTES C. PINNEY.
Lawyer and Proctor in Admiralty,
Rooms 316 and 317 Perry-Payne Building,
Telephone Main 2585. CLEVELAND, O.

W. F. MACKEY. URBAN C. BELL.

MACKEY & BELL,
ATTORNEYS AND COUNSELORS AT LAW,
PROCTORS IN ADMIRALTY.
1020-1022 PRUDENTIAL BLDG.,
BUFFALO, N. Y. TELEPHONE, SENECA 1314.

PATENTS.

E. L. THURSTON. ALBERT H. BATES.

THURSTON & BATES,
Counselors at Law in Patent Causes and Solicitors of Patents,
1028 Society for Savings Bldg., CLEVELAND, O.

WILLIAM M. MONROE,
Patent Attorney.
511 Society for Savings, CLEVELAND, O.
TELEPHONE 2688.
Patents obtained in the United States and Foreign Countries.

PROFESSIONAL.

W. J. WOOD, Naval Architect, Ship Surveyor,
Consulting Engineer.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs.

Vessels designed—Twin S. S. Virginia, Steam Yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.

Complete plans furnished for Steel Composite or Wooden Vessels.

Office on Goodrich Dock, foot of Michigan Ave., CHICAGO, ILL.

MIERS CORYELL,
Consulting Mechanical Engineer.

Plans, Specifications and Superintendence.
Marine and Water Works Engines and Boilers.
21 East Twenty-first Street, NEW YORK.

GUSTAV HILLMANN,
NAVAL ARCHITECT.
Designer of all classes of VESSELS.
470 Greene Ave., near Norstrand, Brooklyn, N. Y.

JOSEPH R. OLDHAM.
Engineer and Naval Architect.

Designs Steam Vessels, Marine Engines and Boilers, and Superintends their Construction or Repairs.

814 Perry-Payne Building, CLEVELAND, O.
Telephone, Doan 440, J.

JOHN HAUG,
Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.
Plans, Specifications and Superintendence of Ships and their Machinery.
Specialties—Bulk Oil Vessels, High Speed Yacht Engines, etc.
206 Walnut Place, PHILADELPHIA.

D. McLEOD, MARINE SURVEYOR and APPRAISER
Of Damages and Losses on Steel and Wooden Vessels.
713 Perry-Payne Bldg., - CLEVELAND, O.

ROBERT CURR,
SURVEYOR OF IRON AND STEEL HULLS.
PLANS AND SPECIFICATIONS FURNISHED.
418-419 Perry-Payne Bldg. CLEVELAND, O.
TELEPHONE 472.

AMBROSE V. POWELL, C.E.
Consulting Engineer.

SPECIALTIES:—Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.
Office, 615 Chamber of Commerce, CHICAGO, ILL.

BOOKS FOR ENGINEERS AT LOW PRICES.

Hawkins' "Aids to Engineers' Examinations — With Questions and Answers," only $2.00.

"Steam Boilers," by Rose, a practical treatise on boiler construction and examination, $2.50.

Marine Review, 418-419 Perry-Payne Building, Cleveland.

Books FOR Naval Architects AT Cut Prices.

MANUAL OF ALGEBRA by Richard C. Buck of the Thames Nautical Training College. Published in London, 1898.

NAVIGATION. Revised edition by Commander Charles Belknap, U. S. N., just issued.

MANUAL OF TRIGONOMETRY, by Richard C. Buck.

RESISTANCE AND PROPULSION OF SHIPS, by W. F. Durand.

These books at special prices for sixty days.

MARINE REVIEW, Cleveland.

HAVE YOU TRIED OUR
SEAMLESS COLD DRAWN **Steel Boiler Tubes?**

MANUFACTURED FROM

SOLID ROUND BAR—NO LAPS, SEAMS OR WELDS.

Cold Drawn Finish and Density of Metal prevent pitting and corroding.
Only Highest Grade of Material used. Sulphur and Phosphorus guaranteed not to exceed .025%.
Cold Drawing renders Metal very Tough, increases Tensile Strength and Elongation.
Tubes do not Split or Crack when re-rolled in Tube Sheet.

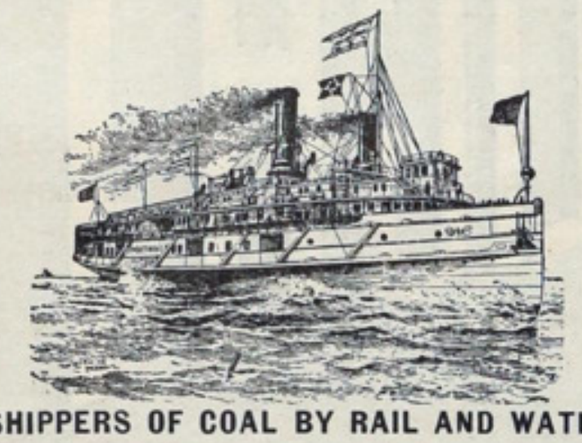
Correspondence Solicited.

SEND US SAMPLE ORDER AND VERIFY ABOVE STATEMENTS.

SHELBY STEEL TUBE CO.,

GENERAL SALES OFFICE,
American Trust Building,
Cleveland, O.

MILLS: Ellwood City, Pa., Shelby, Ohio., Greenville, Pa., Toledo, Ohio.
EASTERN OFFICE AND WAREROOMS: No. 144 Chambers St., New York, N. Y.
EUROPEAN OFFICE AND WAREROOMS: 29 Constitution Hill, Birmingham, England.
WESTERN OFFICE AND WAREROOMS: 135 Lake Street, Chicago, Ills.



SHIPPERS OF COAL BY RAIL AND WATER.

RAPID FUELING DOCKS, DETROIT RIVER.

JAMES GRAHAM & CO.,

Foot Twenty-first St., Detroit, Below Routes of Passenger and Car Ferry Lines.

Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL. Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

Office 1008-9 Chamber of Commerce. Lond distance Telephone 2083.

C. S. Richardson Fueling Co.

COAL

FUELING DOCKS:
NORTH PIER & 18TH STREET BRIDGE.

STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE.-DIVISION ST. BRIDGE, (NORTH BRANCH)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE, (OGDEN CANAL)
SOUTH HALSTED ST. BRIDGE.

OFFICE,
225 DEARBORN ST.
CHICAGO.

GEO. F. LYNN,
TRAVELING SALESMAN.

Cuddy-Mullen Coal Co.

Miners and Shippers of Steam Coal

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—
Car Dumper; Eight Pockets 1,000 tons capacity; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—
Amherstburg, Four Pockets and Three Steam Derricks; Sandwich, 14 Pockets and Two Steam Derricks.

ERIE, PA., BRANCH—Car Dumper.

SAULT RIVER BRANCH—
Two Docks at Detour (formerly known as the Anthony and Watson Docks) Equipped with Pockets and Steam Derricks.

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

Office Telephone, Main 2653. **MARK H. HANLON,** Yard Telephone, Main 886.

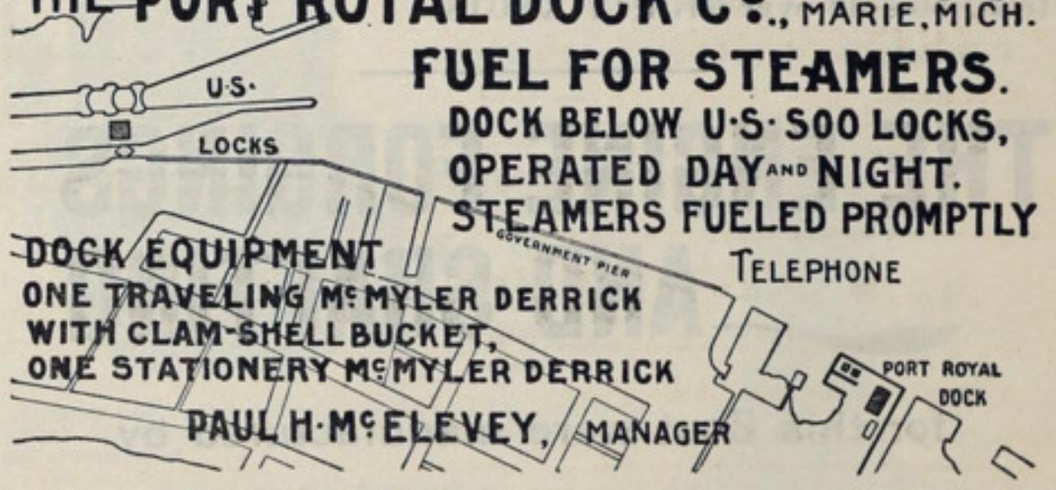
514 Perry-Payne Building, Cleveland, O.

Fueling Pockets. For fueling vessels I have the management and control of the Osborne-Saeger pockets, located next to Cleveland Ship Bldg. Co.'s yard. Steamers coaled on short notice.

Fueling Lighter Reindeer. This lighter is equipped with a clam shell bucket. Steamers fueled in any part of harbor or under the breakwater.

THE PORT ROYAL DOCK Co., SAULT STE. MARIE, MICH.

FUEL FOR STEAMERS.
DOCK BELOW U.S. SOO LOCKS,
OPERATED DAY AND NIGHT.
STEAMERS FUELED PROMPTLY



TELEPHONE

DOCK EQUIPMENT
ONE TRAVELING McMYLER DERRICK WITH CLAM-SHELL BUCKET,
ONE STATIONERY McMYLER DERRICK

PAUL H. McELEVEY, MANAGER

STEAMERS CAN GET FUEL FROM POCKETS, each of which contains from 25 to 150 tons at all times.

The Rochester & Pittsburgh Coal & Iron Co.

REYNOLDSVILLE COAL.

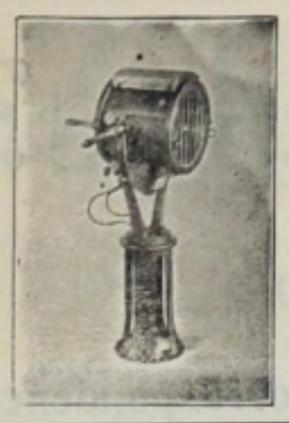
Steamboat Fuel Dock. Blackwell Canal at Michigan St. Bridge. 1400 feet dock frontage.

Steam Elevator and 4 Steam Derricks. Steam Fuel Scow, Capacity 550 Tons. Boats Coaled Day or Night. Modern Car umping Machine; 18 cars per hour capacity.

OFFICE: 694 Ellicott Square Bldg., BUFFALO, N. Y.

TELEPHONES: Ellicott Square Bldg., Seneca 371 A. Dock, Seneca 371 D.

Capt. WM. H. HAZEN,
Dock Superintendent.



Electric Light and Power Plants

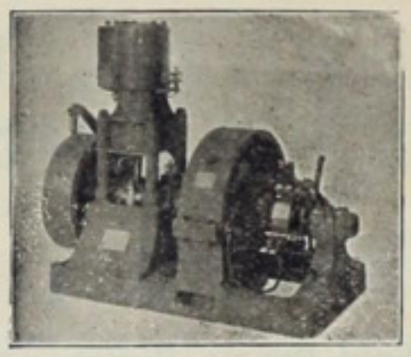
FOR STEAMSHIPS, YACHTS, DOCKS, WHARVES, WAREHOUSES, ETC.

DYNAMO AND ENGINE ON ONE BASE.

ELECTRIC HOISTS. WINCHES AND PUMPS. SEARCH LIGHTS.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y.

Also Offices on the principal Lakes and Seaports of the United States.

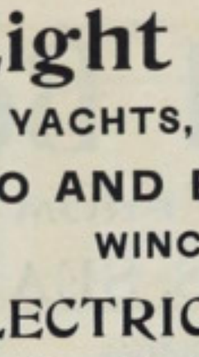


THE WELLS LIGHT MFG. CO.

EDWARD ROBINSON, SOLE PROPRIETOR

46 WASHINGTON STREET, NEW YORK.

WELLS LIGHT



"THE WELLS LIGHT" REG. WALL WORK & WELLS PATENTS

12,000 IN USE.

ESPECIALLY ADAPTED FOR CONTRACTORS, QUARRIES, SHOVELS, RAILROAD CONSTRUCTION, DREDGES, BRIDGE & DOCK BUILDERS, WATER WORKS, BRICK YARDS & COAL DOCKS.

800, 2,000 TO 4,000 CANDLE POWER FROM KEROSENE OIL.

PORTABLE, SELF-CONTAINED, AUTOMATIC, UNAFFECTED BY WEATHER,

400 RAILROADS AND OVER 500 CONTRACTORS NOW USE WELLS LIGHT.

MARINE and NAVAL DESIGNS IN CALENDARS FOR 1899.

Engravings representing the Highest Attainments in Color Work.

All from recent Paintings. Send for samples and prices.

MARINE REVIEW, 418-419 PERRY-PAYNE BUILDING, CLEVELAND.

THE FASTEST BOAT IN THE NAVY.

The Torpedo Boat Destroyer FARRAGUT, on her official trial, steams over THIRTY KNOTS.

THE ENGINE FORGINGS AND SHAFTING

for this Boat were manufactured by

The Bethlehem Iron Company,

SOUTH BETHLEHEM, PA.

Branch Offices: 100 Broadway, New York. 421 Chestnut St., Philadelphia, Pa. 1433 Marquette Bldg., Chicago, Ill.

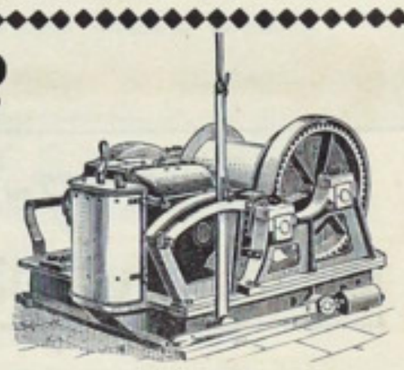
STAYBOLTS BOTH HOLLOW AND SOLID, OF THE BEST QUALITY OF CHARCOAL IRON.

HOLLOW STAYBOLTS are better than drilled or punched in every way. Cost less too. They save inspections and explosions—warn automatically. If you wan' solid staybolts, however, let us hear from you. Our circulars and prices will interest you.

FALLS HOLLOW STAYBOLT CO., CUYAHOGA FALLS OHIO.

LIDGERWOOD IMPROVED HOISTING ENGINES.

OVER 14,000 IN USE.



ELECTRIC HOISTS

Specially adapted for Docks, Warehouses and Steamships.....

Simple, Light and Compact.

SEND FOR CATALOGUE.

LIDGERWOOD MFG. CO.,

96 Liberty Street, NEW YORK.

THE CHASE MACHINE COMPANY,

Engineers and Machinists,

MANUFACTURERS, UNDER THE CHASE PATENTS OF

FOG WHISTLE MACHINES, HOISTING ENGINES,
STEERING ENGINES, AUTOMATIC TOWING ENGINES.
POWER AND DROP HAMMERS, AND OTHER MACHINERY.
ENGINEERS' SUPPLIES, AND GENERAL JOB WORK.

TELEPHONE MAIN 994. 111 Elm Street CLEVELAND, OHIO

NEW YORK. PHILADELPHIA. BOSTON. BALTIMORE. SAN FRANCISCO. NEW ORLEANS.

JOHNSON & HIGGINS,

AVERAGE ADJUSTERS AND FIRE AND MARINE INSURANCE.

Special Facilities for Placing Marine Lines.

GREAT LAKES DEPARTMENT.

Guaranty Bldg.. BUFFALO, N. Y.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

After 20.000 miles of almost continuous steaming since going into commission, including her remarkable trip from San Francisco to Key West, the U. S. Gunboat MARIETTA, equipped with Babcock & Wilcox water tube boilers, ordered the following repair parts:

"T. B. S.—W. D. L.

NAVY DEPARTMENT,
Bureau of Supplies and Accounts,
Washington, D. C.

In reply refer to No. 29181.

June 10, 1898.

Gentlemen:

1. Please forward to the Commanding Officer, U. S. S. 'MARIETTA', Key West, Fla., 8 fire bricks, 4 rights and 4 lefts, No. R, 3440, Babcock & Wilcox boilers, to replace broken bricks between furnace doors.

2. Your bill for these articles should be sent to the same officer and should refer to Steam Engineering Requisition dated June 1, 1898.

Respectfully,

(Sig.) EDWIN STEWART, Paymaster General, U. S. N.

THE BABCOCK & WILCOX CO.,
29 Cortlandt St., New York."

On her long voyage the MARIETTA was not detained an instant on account of boilers.

THE BABCOCK & WILCOX CO., WATER TUBE BOILERS, 29 Cortlandt St., New York.

CLEVELAND CITY FORGE & IRON CO.

CLEVELAND, O.

IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

The DONNELLY SALVAGE WRECKING COMPANY, LIMITED.

Kingston, Ont.

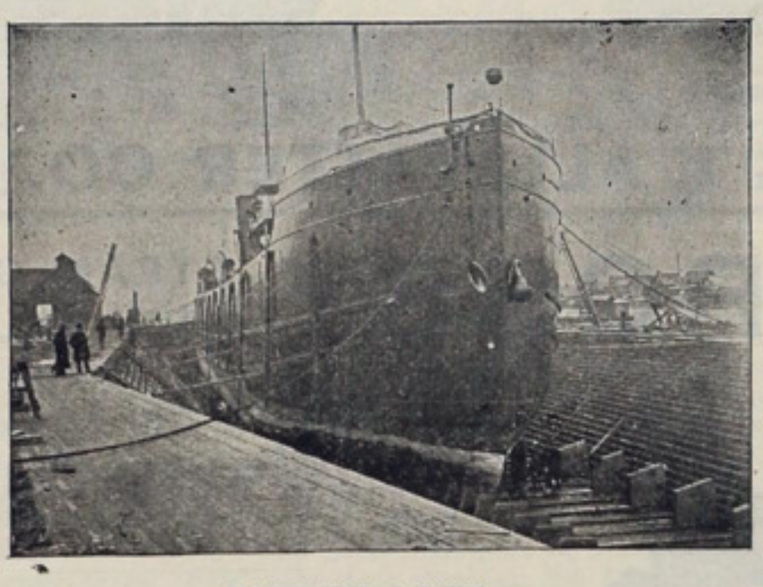
AMERICAN STEEL BARGE CO.

STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Plates & Material Always on hand to Repair all kinds of Metal Ships in Shortest Time.



Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

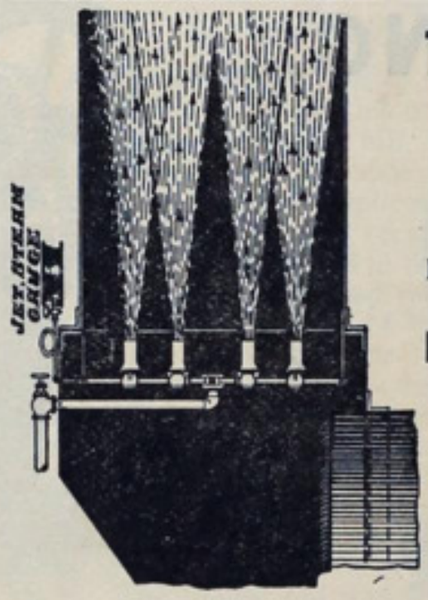
Length, extreme	537 feet.	Entrance, Top	55 feet 9 in
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

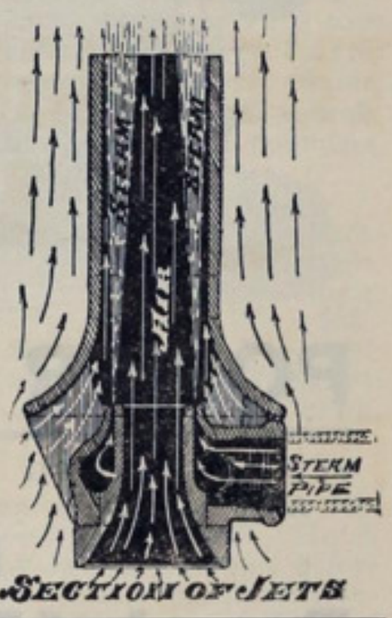
A number of Propellor Wheels in stock at Dry Dock.



THE IMPROVED ANNULAR STEAM JET.

FOR INDUCED DRAFT.

POWERFUL.
ECONOMICAL.
15% TO 25% INCREASE IN POWER.



SECTION OF JETS

Cut on the right shows a section of Jet Castings, which are attached to Spider in stack, as shown by cut on the left.

Requires No Attention.

Always Ready for Use at a Moment's Notice.

H. BLOOMSBURG & CO., 112 35th St., Newport News, Va.

Patentees and Manufacturers.

BARRY BROS. INDEPENDENT TUG LINE, CHICAGO, SO. CHICAGO.

TUGS	RITA McDONALD,	G. A. TOMLINSON,	WM. DICKINSON,	COMMODORE,	TUGS
	CRAWFORD,	D. P. HALL,	IRA D. SMITH,	WELCOME,	
	C. M. CHARNLEY,	PRODIGY,	JAMES A. QUINN,	JACK BARRY.	

CHICAGO OFFICE:
Telephone 273. 240 South Water St.

SOUTH CHICAGO OFFICE:
92d Street Bridge

Tugs G. A. TOMLINSON, D. P. HALL and PRODIGY in service at SOUTH CHICAGO at all times.

3 long whistles call our tugs. Offices open day and night.

ECLIPSE SECTIONAL RAINBOW GASKET.

3/8-INCH FOR PIPE UNIONS.
1/16-INCH FOR HAND HOLES.

Facsimile of a 6-inch section of Eclipse Gasket, showing name and trade mark imbedded

5/8-INCH FOR REGULAR SIZE.
3/4-INCH FOR LARGE SIZE.

MAN HOLES.

Patented and Manufactured Exclusively by

PEERLESS RUBBER MFG. CO.,

16 Warren Street,

+ NEW YORK. +

Write for Testimonials.

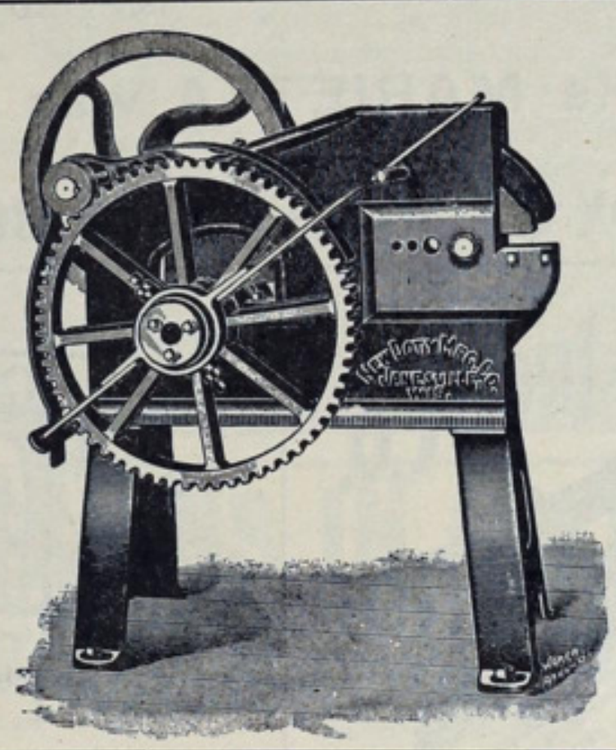
16-24 Woodward Avenue, Detroit, Mich. | 16 Warren Street, New York. | 202-210 So. Water Street, Chicago, Ill. | 17-19 Beale St. & 18-24 Main St. Agents, San Francisco, Cal.

PUNCHES and SHEARS,

For working all sizes of plate or bar metal

For Ship Yards, Boiler Shops, Machine Shops, Blacksmith and Forge Shops, &c., &c.

SEND FOR CATALOGUE.



HAND AND BELT POWER

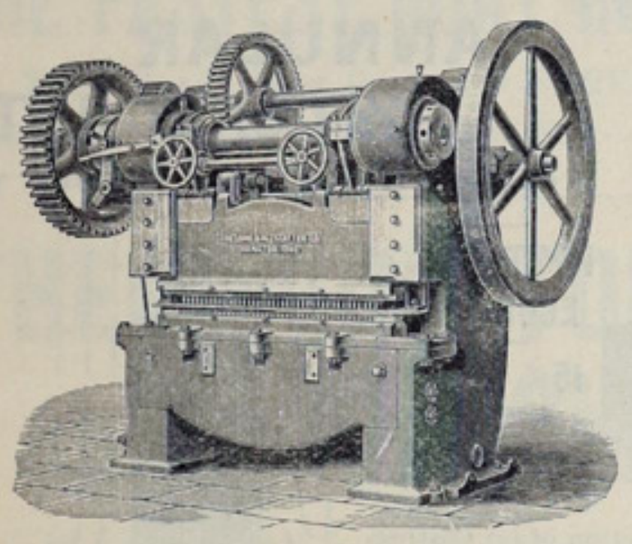
Punches and Shears,

And Bending Rolls.

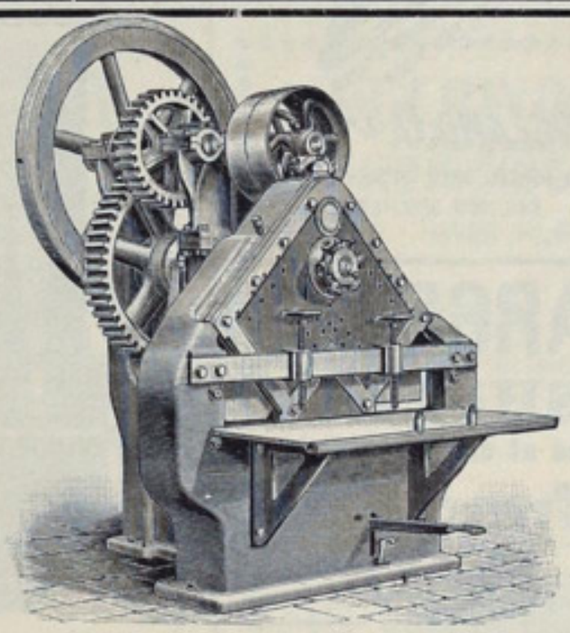
NEW DOTY MFG. CO.

Janesville, Wisconsin, U. S. A.

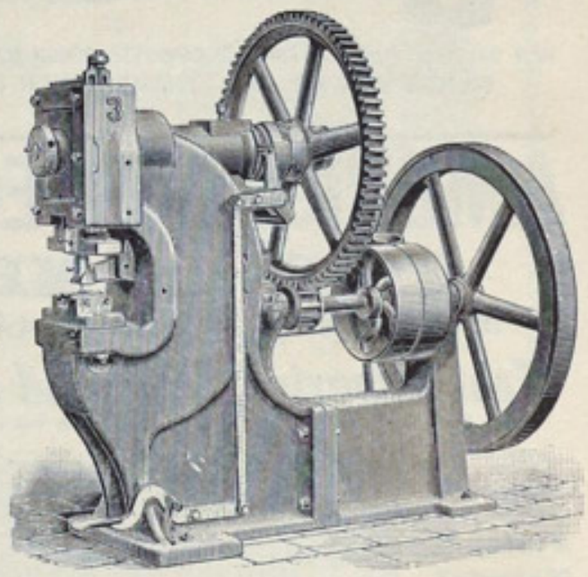
LABOR SAVING..... POWER SHEARS



Belt, Steam or Electric Driven.



Belt, Steam or Electric Driven.



Manufactured by

POWER PUNCHES The LONG & ALLSTATTER CO. HAMILTON, O.

VESSEL TALLYING A SPECIALTY.

TELEPHONE, HARRISON 999.

H. A. FOSS

Board of Trade Weighmaster

90 BOARD OF TRADE BUILDING

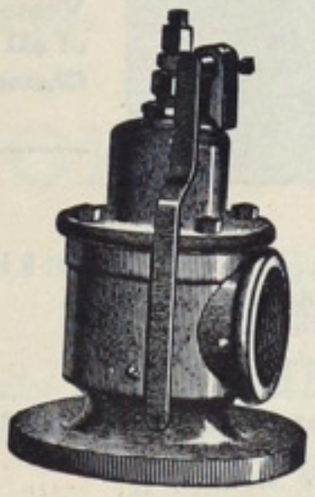
CHICAGO.

SOLICITORS: JOHN WARNOCK. G. ELLIS REAGAN. A. E. SCHUYLER.

THE HEINTZ STEAM TRAP wide open when cold—instantly closes after pipes are blown out and live steam enters the trap. The only trap guaranteed to work perfectly on marine work and under every condition, if properly installed.

Booklet "Q" and particulars furnished by WM. S. HAINES COMPANY, 136 S. Fourth Street, PHILADELPHIA.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES. Locomotive, Marine and Stationary.
CROSBY WATER RELIEF VALVES, for Pumps, Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES.
CROSBY STEAM ENGINE INDICATORS, with Sargent's Electrical Attachment for taking any number of Diagrams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil insertion.
BOSWORTH FEED-WATER REGULATOR, PATENT GAGE TESTER, and many other specialties in Steam Lines.

Main Office and Works: Boston, Mass.

Stores; Boston, New York, Chicago, and London Eng

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.